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EDITORIAL NOTE

This year a new editorial team has taken up the preparation and publication of *The Tasmanian Naturalist*. The Tasmanian Field Naturalists Club and the new editors wish to thank Mark Wapstra for his excellent work over the past nine years in producing this journal. Mark also assisted with the final preparation of the current issue.

This year the Club gratefully acknowledges the sponsorship of this publication by Hans and Annie Wapstra, who are dedicated naturalists and active members of the Tasmanian Field Naturalists Club.

The generous support of sponsors allows us to keep membership fees low and still produce a quality bound and printed journal. We would welcome new sponsors for future issues.

The editorial team is:

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Alastair Richardson

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MT EDITH SUBALPINE FLORA: AN UNUSUAL BOTANICAL COMMUNITY IN NORTHWEST TASMANIA

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ABSTRACT

This article presents the findings of a recent vegetation survey that documented the presence of several alpine and subalpine plant species on Mt Edith in takayna/Tarkine. Several species (including many alpine & subalpine species) found in the area represent significant range extensions, demonstrating the large gaps in natural values knowledge of this region. The new findings add weight to the importance of land management being based on current and accurate data. It is hoped that further biological surveys will be conducted in the region.

INTRODUCTION

Mt Edith is the highest summit of the Norfolk Range, situated in the far northwest of Tasmania, and within the takayna/Tarkine wilderness area. The northern and highest summit is a mere 772 m.

The initial interest in the unusual flora arose from my first visit to Mt Edith for the "Tarkine in Motion" event at Easter 2015 (Bob Brown Foundation n.d.). Whilst the aim of this visit was to focus on scenic photography of the Norfolk Range, it was noted that its summit vegetation community was rather surprising, with known subalpine/alpine species such as *Eucalyptus vernicosa* and *Richea scoparia*. I also noted dwarf *Nothofagus cunninghamii* and other rainforest species present all across the mountain summits, but discontinuous with the rainforests whose treeline ceases at 100 m lower altitude, more or less around 650 m. The intersecting vegetation is of *Melaleuca squamea* and *Sprengelia incarnata* dominated heathland, which is very common in the region. This sparked curiosity and further investigation into the mountaintop species persisting in very exposed conditions. Subsequent sporadic visits confirmed the presence of *Astelia alpina* var. *alpina* (Plate 1). Intrigued by not only the attractive forms of alpine vegetation, but also by the mystery as to its history and existence here, the decision was made, after consulting with a number of botanists and naturalists, to do a more formal survey of the botany characterising this particular mountaintop. It is anticipated that impacts to this vulnerable and delicate floristic community will soon increase with a bushwalking guide *Tarkine Trails - takayna makuminya* (Pullinger 2015) being released at the time of the formal survey, and that there is potential for damage through trampling, irresponsible use of fire, incursion of disease pathogens and invasive species. Also, the impacts of climate change on such a precariously low altitude for these species could result in their local extinction.

Plate 1. *Astelia alpina* var. *alpina*

The purpose of this article is to describe the methods and results of this survey in a botanically under-explored region, and to discuss how the results may assist in understanding and planning conservation measures for this unique area.

METHODS AND RATIONALE

Literature that was consulted included past Tasmanian vegetation surveys Macphail, Shepherd, Brown & Jackson (1975), Kirkpatrick (1982) and that prepared for a report to the Australian Heritage Commission (The Tasmanian Conservation Trust Inc. 1995), none of which mentioned the presence of subalpine flora (bar *Eucalyptus vernicosa*) in the Norfolk Range region, although *Richea scoparia* has been sporadically noted by bushwalkers (J. Shemesh pers. comm.). Several reference texts were consulted on the topics of biosecurity, field survey, collection and data recording methods, Tasmanian alpine vegetation, general Tasmanian flora, notes on rare and threatened species, and the ecology and conservation issues of botanical habitats. This was to provide some foundation and context to understanding the general ecology pertaining to alpine vegetation communities for a citizen scientist untrained in academic botany. A rather haphazard general survey was done mostly over winter and spring months, noting a range of very obvious and easily identifiable known alpine and subalpine species, with GPS references. These were tabulated into an initial spreadsheet from which records from the *Natural Values Atlas* and *Atlas of Living Australia* were compared to determine whether these species were recorded in these databases at or near this location. This would provide a rationale for more directed survey planning for this specific site. The presence of *A. alpina var. alpina* indicated a significant range extension for this species. It was correctly anticipated that more species would be identified with similar range extensions. With this information at hand, professional botanists and ecologists were also consulted to provide supervision, guidance, advice and inspiration for this project, as well as aiming for accuracy for the results to carry some authority and be meaningful to both the academic and lay reader, as well as land managers of this region.

What constitutes "alpine vegetation" in Tasmania is problematic due to the variation in the treeline, and in many instances, the presence of alpine flora species well below conventional alpine altitudes, for instance, into rainforest and other below-treeline zones. For this survey, I used the guidelines of Kirkpatrick (1997), who observed alpine vegetation featuring below the climatic treeline indicating the presence of ideal growth conditions (exposure, cold air drainage, soil hydration etc) at altitudes not conventionally considered alpine. How such unique flora arrived at Mt Edith is an intriguing question – is it a remnant of past glacial times, or is it a more recent post-fire colonisation by wind and bird transfer of seed?

The process of formal survey was conducted by initially selecting *R. scoparia* as an arbitrary index species whose extent indicated a suitable microclimate for an alpine species association zone at this relatively low level (Figure 1). The lowest altitude distribution of *R. scoparia* was mapped by identifying the plants on foot, and documented with a Garmin GPSMapC device and iPhone mapping using the Memory-Map app (Version 1.6.3-343, 2015). As this species is susceptible to fire, the polygon produced through mapping the positions of individual plants indicates a zone that has not seen fire for some considerable time, favouring survival of other fire sensitive species such as those found in alpine zones. Additionally, there was a fairly distinct boundary of this species with *Banksia marginata*, a fire tolerant species. A few plants of *B. marginata* noted within the *R. scoparia* range were mature, and large despite the exposed weather conditions.

A vegetation survey of the areas generally above the lowest *R. scoparia* plants was conducted in late October, and over the 2015/2016 New Year, assisted by botanist Mr Nicholas Fitzgerald on the latter occasion.

This allowed for more precise and speedy identification of species by an expert, with later cross checking of references for accuracy. Where species were not easily and reliably identified with onsite reference photographs, expert input from phone conversations, emails, and the Tasmanian Flora Facebook Page. Where this was deemed inadequate, and the plant in question was plentiful and not known to be on the rare or threatened list, it was collected according to the permit directive, and pressed in the field for Herbarium expert identification at a later stage.

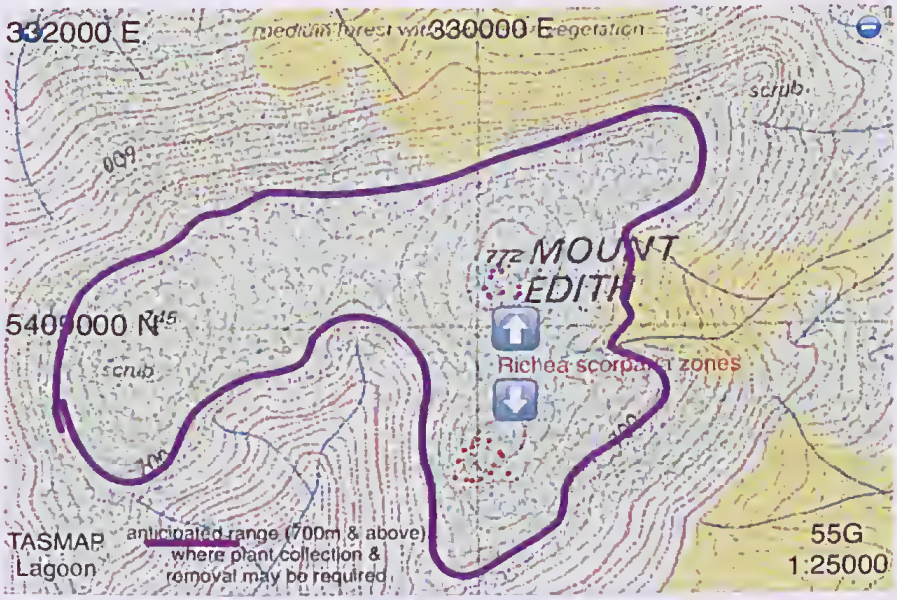

Figure 1. Map for the Flora collection Permit, showing the *R. scoparia* ranges on the northern (pink dots) and southern (red dots) summits of Mt Edith

The resulting data were then uploaded to the *Natural Values Atlas*. Further correspondence with the Senior Botanist, Dr Wendy Potts from the Department of Primary Industries, Parks, Water and Environment, clarified those species with a significantly extended range. I submitted photographic evidence of these species, with future intention to collect good herbarium specimens at an appropriate season.

RESULTS

Many naturalists may find it surprising to discover that a number of subalpine and alpine vegetation species inhabit the upper 50 m altitude zone upon this mountain. The tiny foothold appears tenuous. In all a total of 70 species were identified (Appendix 1). Of these, 22 are identified as subalpine or alpine species, 34 are endemic to Tasmania, and 7 species are palaeo-endemics (sensu Jordan & Williamson 2012) (Table 1). A list of 11 species found with significant range extensions is given in Table 2.

A total of 63 speeies were able to be uploaded to the *Natural Values Atlas* in the initial bateh (Anderson 2016). Figure 2 shows sample locations of these speeies. Further identifieation is pending for some speeimens submitted to the Hobart Herbarium, ineluding a formal identifieation of the *Euphrasia gibbsiae* subspeeies (Plate 2), as these are known to be mountain-speeifie.

Plate 2. *Euphrasia gibbsiae*

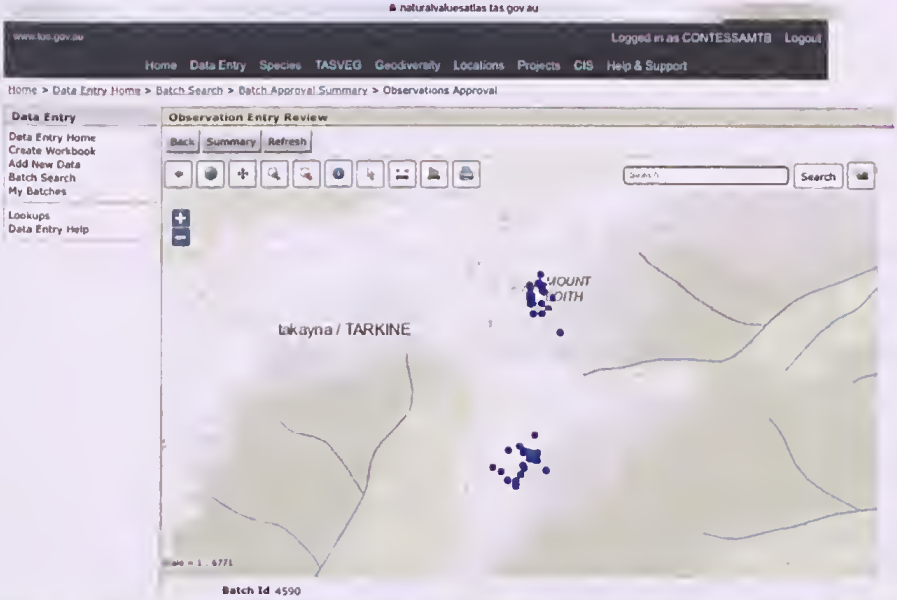

Figure 2. *Natural Values Atlas* batch map for the Mt Edith Supalpine Vegetation Survey. The dots indicate the GPS references of single representative plants only, not the distribution of each species. It does indicate the general range of the supalpine and alpine species in this location.

Isophysis tasmanica

Banksia marginata

Oreobolus oligocephalus

Table 1. Palaeoendemic species (sensu Jordan & Williamson 2012)

Agastachys odorata
Anodopetalum biglandulosum
Archeria comberi
Blandfordia punicea
Cenarrhenes nitida
Isophysis tasmanica
Tetracarpaea tasmannica

Table 2. Species identified with range extension

Anemone crassifolio
Astelia alpina var. *alpina*
Baloskion australe
Carpha curvata
Celmisia asteliifolia
Drosera murfetti
Leucopogon oreophilus
Oreobolus oligocephalus
Ozothamnus rodwayi var. *rodwayi*
Richea milliganii
Senecio leptocarpus

DISCUSSION

This survey confirms the presence of several alpine and subalpine species with significant range extensions. Their presence was not expected due to the low altitude, coastal proximity, and common fire events in the region. According to the key in Kitchener & Harris (2013), this vegetation community is located in the biogeographic region of West Tasmania, and classifies as Western Subalpine Scrub with common species being *Richea scoparia, Oreobolus oligocephalus, Baeckea leptocaulis, Tetracarpaea tasmannica,* dwarf *Nothofagus cunninghamii, Cenarrhenes nitida, Leptospermum nitidum*, dwarf *Anodopetalum biglandulosum, Eucalyptus vernicosa, Monotoca submutica, Agastachys odorata, Isophysis tasmanica, Eurychorda complanata, Bauera rubioides, Boronia citriodora* and *Sprengelia incarnata*, including its cushion form. There seemed a fairly clear demarcation between areas with *Richea scoparia* and areas with *Banksia marginata.* Where there is overlap, the *Banksia marginata* are large plants despite exposure to severe wind pruning and extreme weather conditions, consistent with survival, perhaps for decades, since the last fire. Large burnt *Banksia marginata* skeletons were common on the eastern face of the mountain, which indicate more recent fire activity. This vegetation community grades into *Melaleuca*

squamea heathland (also featuring *Isophysis tasmanica* and *Epacris serpyllifolia* in the lower altitudes). Surprisingly absent from this survey was *Eucryphia milliganii*, which is otherwise common in the rainforests of the region.

In ecological terms, this is a transitional stage in vegetation succession, with moderate fire sensitivity and moderate flammability (Pyrke & Marsden-Smedley 2005). In the absence of hot, destructive fires, this vegetation community would be expected to evolve into rainforest, with a subalpine species component. A threat to this progression is possible impacts from global warming creating drier, hotter climates locally (Morgan 2004), and the consequent increased risk of dry lighting strikes and wildfires, as occurred in the region in January 2016. Additional risks to this vegetation community is that of increased bushwalker visitation causing trampling of the more delicate, tiny species such as *Viola* spp. (Whinam & Chilcott 2003), and the invasion of pathogens such as *Phytophthora cinnamomi* which is present on the lowland walking route to the summit (N. Fitzgerald 2015, pers comm). With increased bushwalker visitation comes an increased risk of the incursion of invasive weeds currently not known to exist on the mountain. Many palaeo-endemic species are intolerant of fire and are susceptible to *Phytophthora.*

This vegetation community exists in a scenic, and desirable bushwalking destination, and indeed its very presence is an attraction to nature lovers. It is therefore necessary to protect its viability and to raise awareness of its place in Tasmanian endemic flora, and to allow for floristic succession in response to climate effects. Bushwalker biosecurity awareness for the region is critical to protect and promote the natural values. Fire management of areas can only be competently undertaken when there is comprehensive knowledge of the vegetation, fauna, hydrology and weather patterns of a particular area. Management should consider the subtle boundaries of fire dependent and fire sensitive vegetation areas, which require skilled analysis and execution, particularly in the expected hotter and drier climate this region will experience. In the absence of adverse impacts, it will be interesting to observe the changes in the vegetation whilst enjoying the additional natural values this mountain top provides. Further surveys to better understand this region are required as it appears that our knowledge of the regional biodiversity has significant gaps.

ACKNOWLEDGMENTS

I am most appreciative of the advice and instruction from botanists Mr Mark Wapstra, Mr Nicholas Fitzgerald, Dr Miguel de Salas, Dr Sue Lewis and Dr Wendy Potts for the encouragement, inspiration, emails, Facebook discussions and phone conversations on many details over identification, collecting protocols, which species were found to have range extensions, and advice with the *Natural Values Atlas* data uploading. Having Nick Fitzgerald accompany me on a field trip was immensely helpful and encouraging. Mr Jonathan Esling also provided encouragement and expert assistance in identification, especially with some of the initial, surprising finds, as well as introducing me to the *Natural Values Atlas* itself. I have been schooled in writing and report preparation by Dr Helen Robertson and Dr Sue Lewis, whose expertise I greatly respect and whose critiques and suggestions have been most welcome. Special thanks also to Mr Daniel Broun who suggested we visit the mountain in the first place, for the inaugural Tarkine in Motion artists' collaborative immersion. Without that prompt, I might not have spent the best part of my spare time for the last year learning botany and relishing the wild places providing this impetus for learning.

APPENDIX 1. Species uploaded to the *Natural Values Atlas*. Common names as per Wapstra et al. (2005)

Scientific name and status (PE = PalaeoEndemic; E = Endemic; A = Alpine/Subalpine)	**Common name**	**General location** North/South summits (N or S), Range Extension (RE)
Agastachys odorata (PE)	fragrant candlebush	N, S
Anemone crassifolia (E, A)	mountain anemone	N, S, RE
Anodopetalum biglandulosum (dwarf) (PE)	horizontal	N, S
Anopterus glandulosus (E)	tasmanian laurel	N
Archeria comberi (PE, A)	pink summit-heath	N, S
Astelia alpina var. alpina (E, A)	pineapple grass	N, RE
Baeckea leptocaulis (E)	slender heathmyrtle	N, S
Baloskion australe	southern cordrush	N, S, RE, common
Banksia marginata	silver banksia	N, S, not as common above the scoparia line
Bauera rubioides	wiry bauera	N, S
Billardiera longiflora (E)	purple appleberry	N
Blandfordia punicea (PE)	christmas bells	N, S, widespread
Boronia citriodora (E, SA)	central lemon boronia	N, S
Bundophoron macrocarpum	lichen	S
Carpha curvata (E, A)	curly strawsedge	S, RE
Celmisia asteliifolia (E, A)	silver snowdaisy	N, RE
Cenarrhenes nitida (PE)	native plum	N, S
Cladia aggregata	staghorn lichen	N, S
Cladia repitora	coral lichen	N, S
Coprosma nitida	mountain currant	N, S
Dicranoloma menziesii	moss	N, S
Dicranoloma robusta	moss	S
Diplarrena latifolia (E)	western flag-iris	S
Drosera murfetii (E, A) (Lowrie & Conran 2014)	alpine sundew	N, S, RE
Empodisma minus (SA)	spreading roperush	N, S, common

Scientific name and status (PE = PalaeoEndemic; E = Endemic; A = Alpine/Subalpine)	**Common name**	**General location** North/South summits (N or S), Range Extension (RE)
Epacris serpyllifolia (E, A)	alpine heath	N, S
Eucalyptus vernicosa (E, SA)	varnished gum	N, S
Eurychorda complanata	flat cordrush	N, S, common
Euphrasia gibbsiae (subspecies TBA ID pending Herbarium) (E)	eyebright	N, S, widespread
Exocarpos humifusus (E, A)	mountain native-cherry	N, S, widespread
Gahnia grandis	cutting grass	N, S
Gaultheria hispida	copperleaf snowberry	S, few plants only
Gymnoschoenus sphaerocephalus	buttongrass	N, S
Helichrysum pumilum (E, A)	dwarf everlasting	N, S, common & widespread
Hibbertia procumbens	spreading guineaflower	N, S
Huperzia varia	long clubmoss	N, S
Isophysis tasmanica (PE)	tasmanian purplestar	N, S, common and widespread
Leptospermum nitidum (E)	shiny teatree	N, S
Leucopogon oreophilus (E, SA)	highland beardheath	N, S, RE
Luzula flaccida (A)	pale woodrush	N
Lycopodiella diffusa	buttongrass clubmoss	N, S, common
Melaleuca squamea	swamp honeymyrtle	N, S, common & widespread
Microsorum pustulatum subsp. *pustulatum*	kangaroo fern	N, S
Monotoca submutica (E, A)	mountain broomheath	N, S
Nothofagus cunninghamii (dwarf)	myrtle beech	N, S, common
Olearia tasmanica (E, A)	tasmanian daisybush	N, S, RE
Oreobolus oligocephalus (E, A)	redsheath cushionsedge	N, E, common, RE
Ozothamnus rodwayi var. *rodwayi* (E, A)	common alpine everlastingbush	N, S, RE
Persoonia nutelleri (E, SA)	highland geebung	N, S

Scientific name and status (PE = PalaeoEndemic; E = Endemic; A = Alpine/Subalpine)	**Common name**	**General location** North/South summits (N or S), Range Extension (RE)
Phyllocladus asplenifolius (E)	celerytop pine	S, single plant
Racomitrium lanuginosum	woolly moss	N, S, RE
Richea milliganii (E)	nodding candleheath	S, 5 plants only in 2 locations, RE
Richea scoparia (E, SA)	scoparia	N, S, index species
Senecio leptocarpus (E, A)	western groundsel	N, S, RE
Siphula coriacea	lichen	N, S
Sprengelia incarnata	pink swampheath	N, S, Common & widespread
Sprengelia incarnata cushion form	pink swampheath	N, S
Stylidium graminifolium	narrow leaf triggerplant	N, S, Common & widespread
Tasmannia lanceolata	mountain pepper	N, S
Tetracarpaea tasmannica (PE, SA)	delicate laurel	N, S
Trochocarpa cunninghamii (E)	straggling purpleberry	N, S
Uncinia nervosa	moorland hooksedge	N, S
Uncinia compacta	compact hook sedge	N, S
Viola sp. *?cunninghamii*	alpine violet	N, S
Xyris operculata	tall yelloweye	N, S

Additional species identified (not as yet listed in the *Natural Values Atlas*)

Name	**Common name**	**Location**
Bossiaea cordifolia	western showy bossia	N, S
Blechnum wattsii	hard waterfern	N, S
Lepicolea scolopendra	liverwort	N, S
Lycopodium fastigiatum	mountain clubmoss	N
Schoenus tenuissimus (ID pending Herbarium)	bogsedge	N, S, common and widespread

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Views of Mt Edith

ARBOREAL SPRINGTAILS IN TASMANIAN RAINFORESTS

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INTRODUCTION

It is not widely appreciated that invertebrate faunas of forest canopies are abundant, rich in species and include taxa not found in ground faunas. Indeed, Ozanne et al. (2003) suggested that 40% of total species may be found in the canopy. Tasmania is the most forested of all Australian States and Territories (apart from the ACT at 50%) with 45% remaining of the original cover (Bradshaw 2012) and yet the invertebrate canopy fauna has hardly been studied. Until now the only data is contained in a summary report of a limited survey (Coy et al. 1993; Yen & Lillywhite 1990). As there are a number of publications on canopy faunas from the Australian continent and overseas (see Greenslade et al. in press), for completeness, I document here what is known of the Tasmanian fauna using Collembola identifications of the 1990 survey by Yen and Lillywhite (1990) and compare this fauna to that of other regions.

METHODS

Eleven rainforest trees from seven different Tasmanian localities comprising four tree species, were fogged in February, 1990. Most trees sampled were *Nothofagus cunninghamii* but three other species were included (Table 1).

Plastic sheets, 2m x 2m, were laid on the ground around each tree to catch fallen fauna and a cross bow was used to fire a rope over an upper branch. The rope was used to haul a spraying machine into the canopy and the tree sprayed continuously from the ground to the top of the canopy (Yen & Lillywhite 1990 unpublished).

All animals falling onto the plastic sheets were collected and preserved in ethanol. A similar method was used at a different time to sample the lower epiphyte fauna up to a height of 15 m from 186 trees on the same sites in Tasmania between 1990 and 1991 (Coy et al. 1993) (Table 2). Methods are described in detail in Coy et al. 1993.

RESULTS

1. Canopy fauna

Altogether, 27,600 specimens of invertebrates were collected belonging to 26 orders (Yen & Lillywhite 1990). There were 1,016 individuals (3.6%) of Collembola which have been identified as 24 species or morphospecies (Appendix). The tree with the richest fauna was a specimen of *Nothfagus gunnii* at Cradle Mountain with 15 species followed by *N. cunninghamii* from the Tasman Peninsula. These two trees also had the highest numbers of individuals (see Table 1).

Because of the limited number of trees fogged, the data is not open to statistical analyses. However, quantitative data is instructive. The Tasmanian fauna was dominated by a single species of *Lepidocyrtoides* (Entomobryidae: Lepidocyrtinae) and several species of Paronellidae.

There were also species of the symphypleone families Katiannidae and Bourletiellidae present. Some differences in composition

between trees were evident in that *N. gunnii* had a high number of *Rastriopes* (Bourletiellidae) specimens compared to *N. cunninghamii* perhaps because this tree was surrounded by myrtaceous heath which is the habitat of this genus (Appendix). No canopy specialists were detected in the Tasmanian samples.

The proportion of Collembola to total invertebrates in these Tasmanian samples was similar to that found in north Queensland tropical rainforest (5.5%), but lower than in cool temperate rainforest in New South Wales (45%) or subtropical rainforest in southern Queensland (30%) (Greenslade et al. in press).

Some data exists on collembolan species collected by canopy fogging from tropical countries to the north of Australia in Indonesia, and is documented here for comparison. In tropical Sulawesi, species numbers of Lepidocyrtinae were higher but abundance was lower (Figure 1a,b; Table 2). Other differences were the higher numbers of species of Neanuridae and a lower abundance Katiannidae and Paronellidae in Tasmania.

2. Tree trunk fauna

Because Yen & Lillywhite (1990) included tree trunk faunas in their sampling a comparison was made between collections from tree trunks in Seram and Tasmania only, even though the number of trees sampled was an order of magnitude different, 15 in Seram and 186 in Tasmania. Even so, the number of species is similar and the contribution Collembola made to the total faunal abundance was slightly higher in Tasmania at 26% compared to 17.5% in Seram (Greenslade unpubl. data; Stork & Brendell 1993). Moreover, it was the most abundant group in Seram, being more abundant than Formicidae which comprised only 10% of total fauna. Other groups such as Psocoptera were more abundant in Tasmania while Amphipoda, although abundant in Tasmania, were absent in Seram. There was also a difference in the species/family profile for Collembola in that forests in Seram were dominated by Entomobryidae species to a greater extent than were forests in Tasmania (Figure 2b) although abundances were similar. Symphypleone families on tree trunks differed markedly between Seram and Tasmania.

Because of the large differences in abundances between sites in Tasmania which did not appear to be related to total DBH or percentage cover of epiphytes, the previous three days rainfall before sampling was obtained from archived records of the Bureau of Meteorology and correlated with total abundance and percentage representation of Collembola in the total fauna for each site. Total invertebrate abundance was not strongly correlated with rainfall (r=0.55), but Collembola abundance was at r=0.7. Because some taxa are more abundant in dry conditions (e.g. Diptera), to avoid this confusing variable and more accurately represent the response of Collembola catch compared to the total fauna, the percentage representation of Collembola was used and gave a high correlation with the previous three days rainfall at r=0.94% for 126 trees on nine sites.

From a conservation point of view, it is important to know if there are any species restricted to tree trunks, and because the fauna of Tasmania is better known than that of Seram, it was possible to detect several Collembola that are potential tree trunk specialists in the fauna belonging to the genera *Acanthomurus*, *Brachystomella* and *Setanodosa*. There may also be some short range endemics among these genera (Greenslade 2008). An attempt was made to examine the effect of fragmentation on Tasmanian rainforests by sampling tree trunks on the edge of a forest patch and those 100 m further into the interior. Large differences in abundance of some groups

between edge and interior were documented by Coy et al. (1993) and Greenslade (1992).

DISCUSSION

As Yen & Lillywhite (1990) sampled both tree trunk fauna and canopy as the misting machine sprayed while it was being hauled from ground level to the canopy, a strict comparison cannot be made with canopy spraying data, but, from the results presented here, collembolan abundance and proportion to rest of the fauna in the canopy is lower than would be expected from the tree trunk fogging alone. I suggest this may be because the Tasmanian canopy collections were made in summer while most of the tree trunk samples were made mainly in cooler seasons and some during heavy rain (Table 1).

In conclusion, it is evident that species richness in Tasmanian canopies is likely to be comparable to that in rainforests in other climates although invertebrate order and collembolan family composition differ. Rather than climate or latitude, the main determinant of species richness and abundance may be the trunk cover of epiphytes, including mosses, lichens, vines, lianas and even orchids on the trees and their moisture levels. All trees sampled in Tasmania had a near complete cover over the trunk surface that was sprayed. Moreover, the fauna is likely to include some tree trunk specialists; one Symphyla has already been described (Clark & Greenslade 1996). Two species of Amphipoda, two of Isopoda, one of Diplopoda have also been recorded more commonly on tree trunks than on the ground (Coy et al. 1993).

These results are not only of significance for biodiversity conservation but also indicate that when rainforests are fragmented, some loss of their characteristic fauna occurs. This is particularly important under a climate change scenario. Some of the rainforest sites sampled in 1990 currently exhibit significant pressures associated with climate change and modern anthropogenic pressures (C. Duncan pers. comm.). Using future climate predictions, the keystone cool temperature rainforest tree, *N. cunninghamii*, is considered vulnerable and current Tasmanian populations are predicted to shrink by up to 49% by the 2050s (Worth et al. 2015). As well, at least part of this loss may be attributed to unregulated and inappropriate logging practices.

ACKNOWLEDGEMENTS

Field and laboratory assistants who contributed to collecting data are too numerous to list individuals but I thank them as a group. Thanks are also due to the Department of Parks, Wildlife and Heritage for permission to collect in the conservation areas used, to A. Yen and P. Lillywhite for permission to identify collections they made and to N. Stork for sending specimens of Collembola from Seram, Sulawesi and Borneo to me.

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APPENDIX

The Appendix is available online at

http://www.tasfieldnats.org.au/naturalist/
See the folder for *The Tasmanian Naturalist* 2016.

Table 1. Trees sampled with canopy fogging, location, date and coordinates in Tasmania, abundance, number of species of Collembola and rainfall in the previous three days

No.	Species	Location	Coordinates	Date	No. of spp	No. of indivs	Rainfall (mm)	Tree height (m)
1	*Nothofagus cunninghamii*	Mt Michael A	148°00.4', 41o10.9'	20.ii.1990	1	12	0.2	13.6
2	*Nothofagus cunninghamii*	Frodshams Pass B	146°22.9', 42°49.7'	15.ii.1990	1	3	0	47.6
3	*Atherosperma moschatum*	Big Sassy Creek	147°54.3', 42°08.5'	19.ii.1990	2	2	1.8	18.6
4	*Nothofagus cunninghamii*	Mt Michael B	148°00.0', 41°10.9'	21.ii.1990	3	26	6.2	16.4
5	*Nothofagus cunninghamii*	Cradle Valley	145°55.9', 41°35.4'	25.ii.1990	8	61	7.4	14.4
6	*Nothofagus cunninghamii*	Frodshams Pass A	146°22.9', 42°49.7'	15.ii.1990	8	58	?	19.1
7	*Arthrotaxis selaginoides*	Cradle Valley	145°55.9', 41°35.4'	24.ii.1990	9	95	7.4	28.9
8	*Nothofagus cunninghamii*	Projection Bluff	146°43.5', 41°43.1'	23.ii.1990	7	78	7.4	5.3
9	*Nothofagus gunnii*	Cradle Valley	145°55.9', 41°35.4'	24.ii.1990	15	218	7.4	7
10	*Nothofagus cunninghamii*	Tasman Peninsula	147°17.0', 43°22.1'	13.ii.1990	12	463	34.2	17.3
11	*Nothofagus cunninghamii*	Savage River	145°16.2', 41°19.1'	26.ii.1990	0	0	0	10.4

Table 2. Tasmanian Collembola from pyrethrum knock down of tree trunks, number of trees, date, total individual invertebrates, number and percentage of Collembola (Addit = additional sites)

No.	Location	Coordinates	Date	Number of trees	Previous 3 days rainfall	Edge/Interior	No. of indivs	No. of Collembola	% Collembola of total
Addit.	Riveaux Creek	146° 38.6', 43° 10'	20.xii.1988	6	0	0/6	394	42	10
Addit.	Simons Road	147° 31.3' 41° 21.5'	8.iii.1989	3	0.2	0/3	68	8	11
11	Pirates Road	147°54.5', 43°02.8'	16.iii.1989	10	26.4	0/10	1156	545	47
12	Bruny Island	147°17.0', 43°22.1'	4.iv.1989	11	0.2	0/10	2121	512	24
2	Bradshaws Road	145°37.0' 41°49.9'	18.iv.1989	28	27.2	15/13	3501	2180	62
1	Savage River	145°16.2', 41°19.1'	19-20.iv.1989	36	37.2	3/33	13482	8439	63
7	Big Sassy Creek	147°54.3', 42°08.5'	12.v.1989	20	9.4	0/20	12085	2008	17
8	Sandspit River	147°51.5' 42°42.1'	2.vi.1989	9	10	0/10	2438	556	34
Addit.	Bathurst Harbour	146°09'36.0243°19'09.23"	14.ii.1990	3	0.2	0/3	717	34	5
9	Frodshams Pass	146°22.9', 42° 49.7'	8.iii.1992	22	0	0/22	8468	847	10
4	Cradle Mt	145°55.9', 41°35.4'	14.xi.1989	12	20.8	3/9	13728	2918	20
6	Mt Michael	148°00.4', 41°10.9'	26.xi.1989	10	24.8	0/10	18709	3232	9
4	Mt Victoria	147°49.9' 41°20.4'	xi.1989	13	0	11/2	22064	4836	20
3	Projection Bluff	146°43.5' 41°43.1'	ii.1990	3	0	0/3	Not sorted		
Totals				186		32/154	98931	26157	Mean 26%

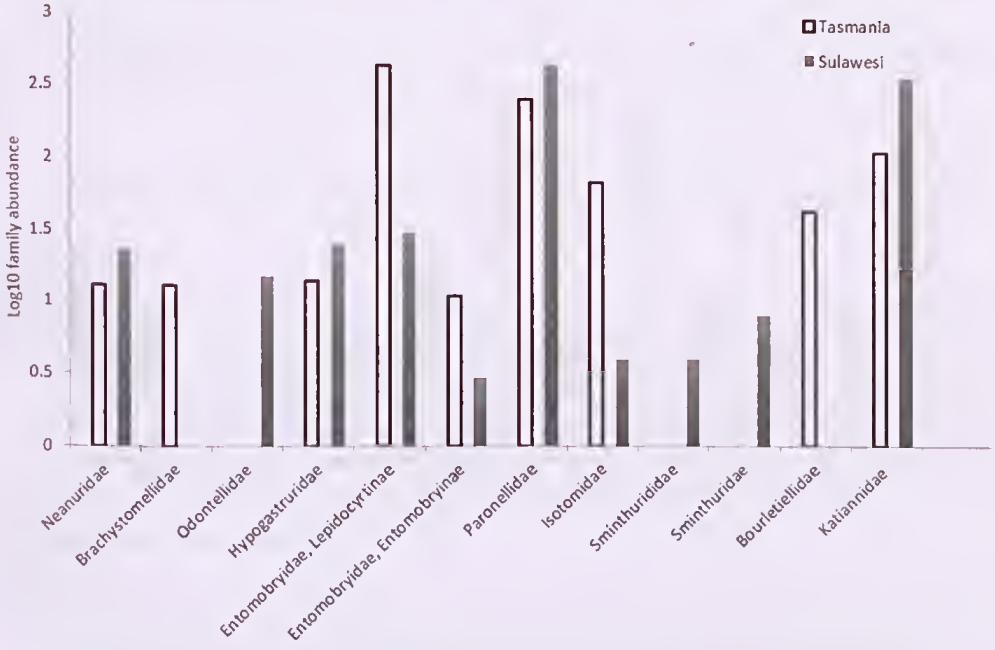

Figure 1a. Log_{10} abundances of Collembola per family in canopy fogging collections from Sulawesi and Tasmania

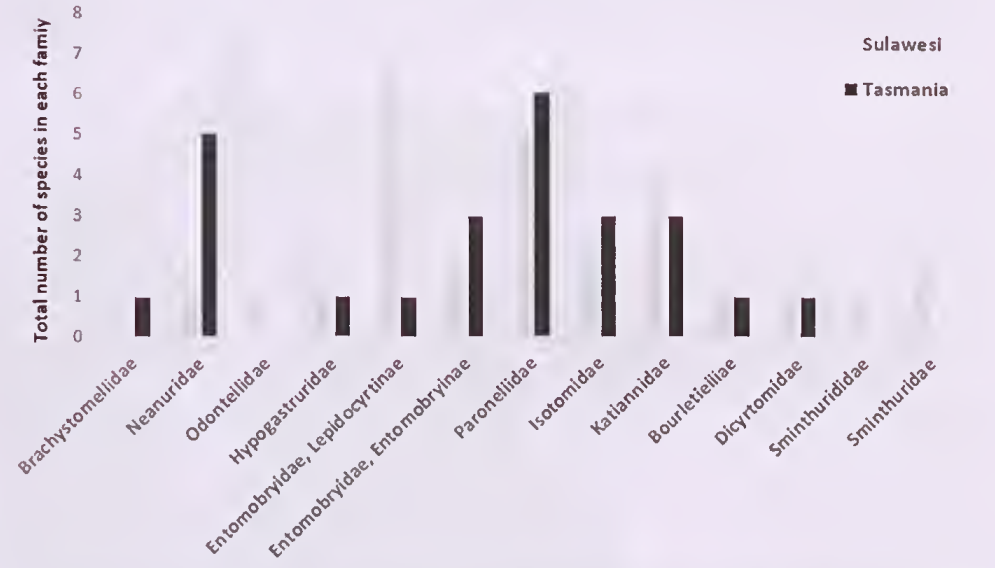

Figure 1b. Number of species per family of Collembola in canopy fogging collections from Sulawesi and Tasmania

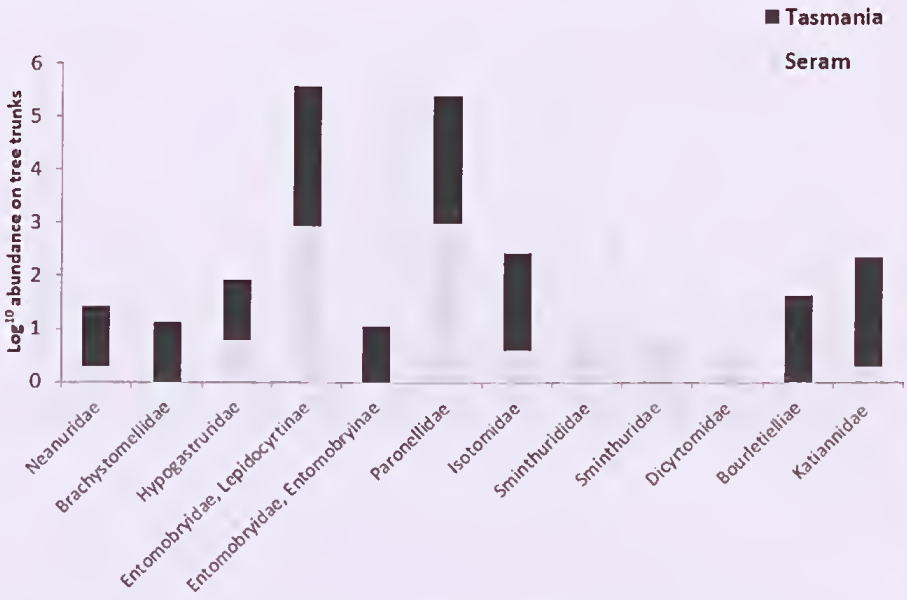

Figure 2a. Log_{10} abundance of Collembola per family on tree trunks in rainforest of Tasmania and Seram

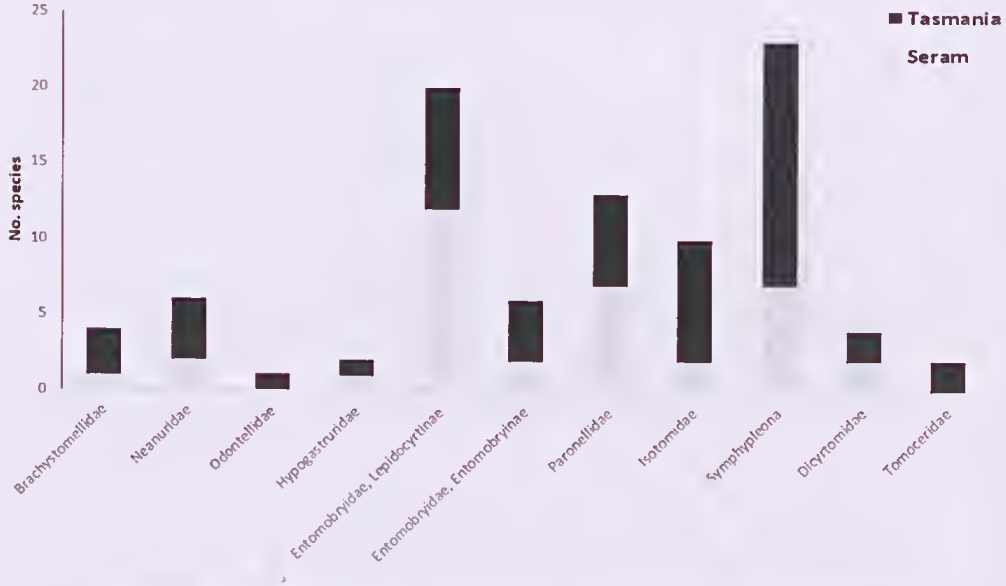

Figure 2b. Number of species per family on tree trunks in Seram and Tasmania

SEEING THE FOREST FOR THE TREES – FLORISTIC COMPOSITION IN A TALL, WET *EUCALYPTUS OBLIQUA* FOREST OF SOUTHERN TASMANIA

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ABSTRACT

Mapping the individual trees ≥10 cm diameter in four 50 x 50 m plots in the tall, wet *Eucalyptus obliqua* dominated forest in southern Tasmania revealed aspects of the fire history of this forest which had not been discernible from the large-scale overview of these plots. In particular, we found that a second fire had occurred in part of one of the four plots 72 years prior to the start of the survey, contradicting a previous assessment that had concluded that the area was uniformly burnt by an earlier fire 108 years before the survey began.

INTRODUCTION & BACKGROUND

The expression used of someone who "can't see the forest for the trees" describes a person who looks too closely at the details of a problem (i.e. the trees) and thereby misses out on seeing the bigger picture (i.e. the forest). In this work, we turn the meaning of the expression on its head and show that by identifying and mapping the individual trees in a forest plot, one can derive a better idea of how the forest is structured as a whole rather than by a superficial overview. That is, the attention paid to the fine detail, obtained by measuring the diameters of all trees and plotting the positions of the trees ≥10 cm diameter on a 2-dimensional graph, has its reward in the facts revealed about the plot, especially its previous fire history.

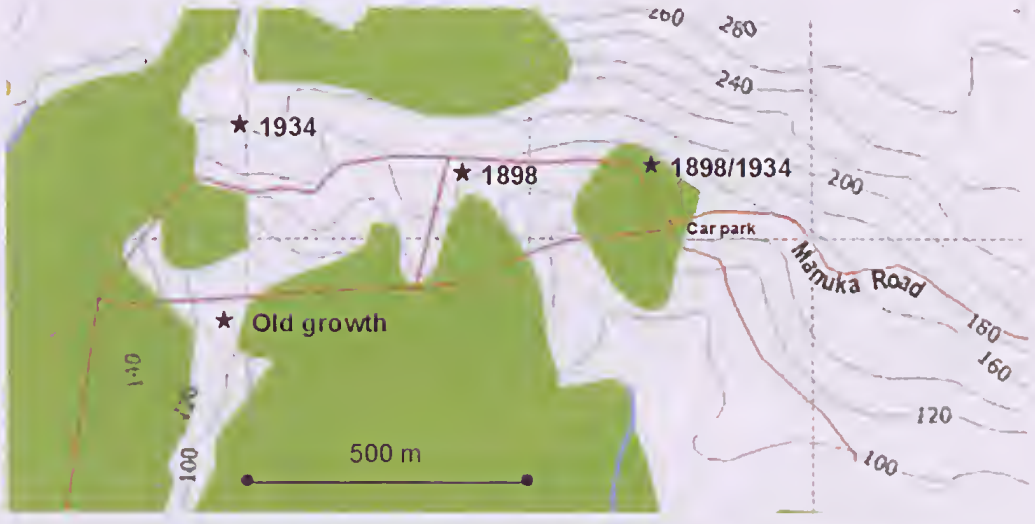

Figure 1. Position of the four plots along the 'Bird Track', Warra LTER site

MATERIALS & METHODS

All field work was conducted in tall, wet, native *E. obliqua* forest at the Warra LTER (long-term ecological research) site in southern Tasmania, west of Geeveston, an area of 15,900 ha that was designated in 1995 to encourage long-term ecological research and monitoring in wet forests in Tasmania (Brown et al. 2001). The plots used in the study reported here were all situated along a track north of the Huon River known as the 'Bird Track', and accessed from the car park at the western end of Manuka Road (Figure 1). Four plots of presumed known fire history were chosen along this track, the age since fire having previously been determined for the Warra LTER site (Hickey et al. 1999). In general terms, fire ages for these forests were determined by a combination of (1) tree coring to count growth rings, (2) identifying species compositions that correspond to particular fire-free intervals, (3) relating the diameter sizes of trees to age since their fire-stimulated germination and identifying any subsequent fire by their fire scars, (4) identifying species with known germination and life span history, and their responses to different fire intensities, and (5) using existing maps of fire history. The 'Bird Track' site had the advantage that it provided plots within walking distances of each other, with the same south-facing aspect and similar altitude, rainfall, temperature, and forest type. This ensured a high degree of similarity among the plots except for differing wildfire histories that resulted from the natural disturbance of stand-replacing wildfires at different times. Details about the four plots (latitude and longitude, slope, soil pH, soil % total nitrogen and % total phosphorus) can be found in Gates (2009).

The ages of the plots since wildfire had been determined, respectively, as 200-300 years, 108 years, 72 years and a plot that was burnt twice, i.e. it was within a 108 year old forest that was burnt again 36 years later (Turner et al. 2007). The names given to the plots at the time of their establishment in the year 2006, motivated by convenience but which reflected their wildfire history, were 'Old growth', (a forest that had not experienced a wildfire for at least two centuries),'1898' (believed to have been last burnt in the year 1898), '1934' (last burnt in the year 1934) and '1898/1934' (a plot that had been burnt both in 1898 and 1934), respectively.

The size of the plots in each of the wildfire histories was 50 x 50 m, divided into 25 10 x 10 m subplots using star pickets placed at 10 m intervals at two opposite outer boundaries. The remaining corners of each subplot were marked with fibreglass rods, and twine was strung from the star pickets up and down the plot but not across. All vascular plants were identified and named to species level as given in Buchanan (2007). Using a diameter tape, stems of all sizes for all woody species were recorded. Stems ≥10 cm diameter for all species had their positions measured with respect to the plot boundaries so that they could be mapped in each plot. Hence, the final tabulation from each of the four plots contained, for each woody species, the diameters of all trees of all sizes and the coordinates of each tree whose diameter was at least 10 cm. The aim of this article is to show that a map giving the positions of the vascular plants in the forest plot may provide useful additional information about the plot's fire history.

RESULTS & DISCUSSION

The information obtained about the vascular species present in each of the four 0.25 ha plots examined in this survey consists of two components, one tabular and one visual. The tabular information appears in Table 1, which enumerates the number of records of each of the species present in the plot and the contribution that they make to the total basal area (BA) of the plot. The visual information appears in Figures 2a–d, which has four parts, one for each plot. As the

positions of all woody species ≥10 cm diameter are mapped in two dimensions, the exact location of each tree with respect to all other trees in the plot is pinpointed. Differences in tree size are not displayed, as the graphs involve different species of vascular plants which have different size ranges. Therefore, the symbols used in Figures 2a–d are all approximately the same size. Also, to avoid clutter, only the nine most commonly occurring species are shown, but these account for almost all of the basal area of each plot. In the following paragraphs, each plot is considered in turn.

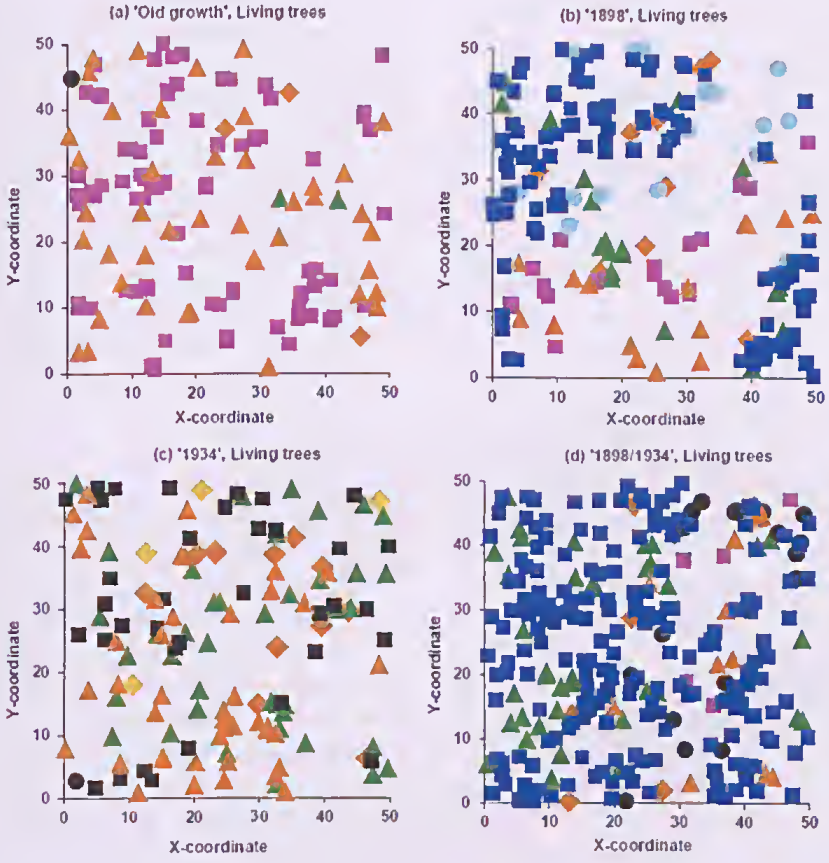

Figure 2. Positions of all trees ≥10 cm diameter. (a) 'Old growth' plot. (b) '1898' plot. (c) '1934' plot. (d) '1898/1934' plot. The symbols representing the tree species are as follows: *Acacia dealbata* ( ). *Acacia melanoxylon* ( ). *Atherosperma moschatum* ( ). *Encryphia lucida* ( ). *Eucalyptus obliqua* ( ). *Monotoca glauca* ( ). *Nothofagus cunninghamii* ( ). *Olearia argophylla* ( ). *Pomaderris apetala* ( ).

Table 1. Living tree species in each plot, number of records and %BA (basal area), listed in decreasing order of %BA of the total

'Old growth'

Eucalyptus obliqua (54.0%[1]; 2[2]; 350[3])
Nothofagus cunninghamii (24.9%; 189; 110)
Atherosperma moschatum (17.7%; 216; 80)
Acacia melanoxylon (3.0%; 5; 80)
Eucryphia lucida (0.4%; 8; 35)
Anopterus glandulosus (<0.1%; 4; 5)
Coprosma quadrifida (<0.1%; 5; 6)
Phyllocladus asplenifolius (<0.1%; 1; 1)
Pimelea drupacea (<0.1%; 11; 1.5)
Tasmannia lanceolata (<0.1%; 1; 1.5)
Total: 442 living stems

'1898'

Eucalyptus obliqua (66.3%; 19; 300)
Pomaderris apetala (11.5%; 193; 27.5)
Nothofagus cunninghamii (9.3%; 86; 65)
Atherosperma moschatum (5.7%; 50; 50)
Acacia melanoxylon (3.6%; 10; 60)
Olearia argophylla (3.3%; 37; 34)
Phyllocladus asplenifolius (0.2%; 4; 18.5)
Anopterus glandulosus (<0.1%; 2; 1.5)
Coprosma quadrifida (<0.1%; 5; 4.3)
Cyathodes glauca (<0.1%; 1; 1)
Monotoca glauca (<0.1%; 2; 7.5)
Pimelea drupacea (<0.1%; 8; 1)
Pittosporum bicolor (<0.1%; 1; 7)
Total: 418 living stems

'1934'

Eucalyptus obliqua (85.7%; 40; 230)
Nothofagus cunninghamii (6.0%; 167; 35)
Monotoca glauca (3.5%; 174; 21)
Acacia melanoxylon (2.2%; 18; 32.5)
Acacia dealbata (0.8%; 5; 31.5)
Nematolepis squamea (0.4%; 2; 25.5)
Phyllocladus asplenifolius (0.4%; 22; 15.5)
Tasmannia lanceolata (0.3%; 29; 12.5)
Pittosporum bicolor (0.2%; 2; 23)
Cyathodes glauca (0.1%; 32; 8.5)
Eucryphia lucida (0.1%; 3; 18)
Anopterus glandulosus (0.1%; 33; 11.5)
Atherosperma moschatum (<0.1%; 3; 3)
Coprosma quadrifida (<0.1%; 7; 2.5)
Pimelea drupacea (<0.1%; 7; 1.5)
Total: 544 living stems

'1898/1934'

Eucalyptus obliqua (73.9%; 39; 250)
Pomaderris apetala (17.2%; 832; 25.5)
Acacia melanoxylon (3.5%; 13; 70)
Eucryphia lucida (2.2%; 78; 36)
Nothofagus cunninghamii (1.6%; 155; 33)
Atherosperma moschatum (0.5%; 18; 17.5)
Phyllocladus asplenifolius (0.4%; 54; 27)
Olearia argophylla (0.3%; 17; 9.5)
Acacia verticillata (0.1%; 3; 12)
Anopterus glandulosus (0.1%; 29; 10)
Coprosma quadrifida (0.1%; 28; 5)
Cyathodes glauca (0.1%; 29; 7)
Aristotelia peduncularis (<0.1%; 4; 3)
Monotoca glauca (<0.1%; 2; 1)
Pimelea drupacea (<0.1%; 20; 1)
Pittosporum bicolor (<0.1%; 1; 3)
Tasmannia lanceolata (<0.1%; 11; 6.5)
Total: 1,333 living stems

[1] pereent basal area of the total; [2] number of living stems; [3] maximum diameter (em)

'Old growth'

There are only two *Eucalyptus obliqua* trees in the 0.25 ha plot, but they occupy 54% of the basal area (see Table 1), as one of them is 350 cm diameter and the other is 230 cm diameter. These old eucalypts are moribund, and if fire continues to be excluded from this plot, these trees will persist as stags (i.e. standing dead trees) after their death or become part of the coarse woody debris that is present in and around the plot, the volume of which is largely made up of large, dead eucalypts. Aside from these two trees, the only other substantial contributors to the basal area (BA) are the 189 stems of *Nothofagus cunninghamii* ('myrtle') which collectively occupy 24.9% of the BA and the 216 stems of *Atherosperma moschatum* ('sassafras'), which accounts for a further 17.7% of the BA. This leaves only 3.4% BA for the remaining six species, of which the five stems of *Acacia melanoxylon* accounts for 3.0% BA. Thus, only four vascular species occupy more than 99% of the BA, highlighting the low diversity of forests that are either rainforests or tending towards becoming rainforests. The 'Old growth' plot closely fits the C-type classification, viz. "*Eucalyptus obliqua* over callidendrous rainforest" as found in the Warra LTER silvicultural systems trials (Neyland 2001), located a few kilometres to the east of the Bird Track plots. Callidendrous rainforest is one of the types of cool temperate rainforest dominated either by myrtle or by sassafras (Jarman et al. 1984). In 'Old growth', these two species are present in approximately equal numbers irrespective of whether one counts the number of stems or uses BA to make the judgement. Visual examination of Figure 2a shows that these two rainforest species are fairly randomly distributed throughout the 50 x 50 m plot. This is consistent with the pre-existing information that fire has been excluded from this plot for a very long time.

'1898'

From the tabular information in Table 1, we see that there are six species that account for more than 99% of the BA. These include the four species that were also prominent in the 'Old growth' plot, to which *Pomaderris apetala* (11.5% BA) and *Olearia argophylla* (3.3% BA) have been added. Although *P. apetala* accounts for only 11.5% of the basal area, its 193 stems make up 46.2% of the number of living trees in the plot. This small tree, the largest of which in this survey had a diameter of 27.5 cm, is a common component of eucalypt-dominated wet forests or the margins of rainforest and was a common component of the understorey on high fertility soils in the *Eucalyptus regnans*-dominated forests in the Florentine Valley where there was a moderate fire frequency (1–2 fires per century) (Gilbert 1959). The map of the '1898' plot (Figure 2b) presents an entirely different picture from that presented by the 'Old growth' plot (Figure 2a), due to the presence of *P. apetala* and to a lesser extent *O. argophylla*, and, more particularly, the positions in the plot where they occur.

These two species are prominent in a broad area in the upper left-hand corner of the plot and in a narrower area in the lower right-hand corner. Interspersed with these two species are stems of *E. obliqua* and *A. melanoxylon*. The presence of *P. apetala* in these areas contradicts the belief that the '1898' plot had its last fire in 1898, as determined in the preliminary fire assessment of the area at the time of establishment of the research plots (Turner et al. 2007). Core samples (see Gates 2009, Figure 2.6, p. 26) taken from the '1898' plot showed that the oldest *P. apetala* trees were 72 years old, thereby dating them as having been established in the year 1934. The two major rainforest species *N. cunninghamii* and *A. moschatum* are notably absent from the areas with abundant *P. apetala*. Instead, they occur exclusively in a band extending from the middle upper right-hand corner of

the plot to the central lower area and also near to the left-hand boundary of the plot. Therefore, the '1898' plot is not of a single forest type, but consists of at least two portions, the one with abundant *P. apetala* burnt 72 years before the study commenced, and the other portion that had been unburnt for a much longer period of time and which contains all 16 of the *N. cunninghamii* trees and all 27 of the *A. moschatum* trees that are ≥10 cm diameter. Also surviving in this latter region is a cluster of *E. obliqua* trees, three of which are of large diameter (80, 85 and 120 cm).

'1934'

The '1934' plot is very different from the other plots of this study. The tabular listing (Table 1) shows that the most frequently occurring species is *Monotoca glauca*, with 174 stems (32% of the individual trees), although in terms of basal area it accounts for only 3.5% of the total BA, the vast majority of the trees being less than 10 cm diameter. This species is spread out over the whole of the plot (Figure 2c). There is also an almost complete absence of *A. moschatum*, there being only three stems, the largest of which is only 3 cm diameter. Although the other main rainforest species, *N. cunninghamii*, is abundant there (167 stems), 73% of these are less than 10 cm diameter. Table 1 shows that the main contributor to the overall basal area is *E. obliqua*, accounting for 85.7% of the BA, which is by far the largest percentage of any of the four plots. Aside from *E. obliqua*, *M. glauca* and *N. cunninghamii*, only *Acacia melanoxylon* and *A. dealbata* contributed more than 0.5% to the BA, as the other ten tree species collectively add only 1.8% to the overall BA. The main factor differentiating the '1934' plot from the other three plots is that this plot is situated on a sandstone outcrop, whereas the other plots are on dolerite. The forest type that best describes the '1934' plot is WET-OB101 of the *Forest Botany Manual* (Forest Practices Authority 2005), which is one of the examples of a tall *E. obliqua* forest that occurs at low altitudes on low fertility soils. WET-OB101 is the floristic community *E. obliqua–N. cunninghamii–Monotoca glauca*, which describes the main components perfectly. This forest type may contain a variety of understorey species. The keys for WET-OB101 in the *Forest Botany Manual* (Forest Practices Authority 2005) state the following: "leatherwood (*Eucryphia lucida*), celery-top pine (*Phyllocladus asplenifolius*), horizontal (*Anodopetalum biglandulosum*) and native laurel (*Anopterus glandulosus*) sparse or absent", which was certainly true for the '1934' plot at the start of this study, but these keys also state that "dogwood (*Pomaderris apetala*), musk (*Olearia argophylla*), lancewood (*Nematolepis squamea*) or prickly moses (*Acacia verticillata*)" is common, none of which is true for '1934'. This merely illustrates the great variability of Tasmanian forests, and how vascular species may be present in one representative of a forest type, and replaced by another species in other examples of that forest type. Because soils derived from sandstone are of lower fertility and lower pH (the measured pH of the '1934' plot was 4.3, the lowest of any of the four plots) than soils derived from dolerite, they are not able to support *P. apetala*, which requires the more fertile soils derived from dolerite (Forest Practices Authority 2005). Transects in the *Eucalyptus regnans*-dominated forests of the Florentine Valley also contained *M. glauca* when soil fertility was low and fire frequency was moderate (Gilbert 1959).

'1898/1934'

The fire assessment revealed that the '1898/1934' plot had two fires, the first of which occurred in 1898 (i.e. 108 years before the start of this study) and the second of which occurred in 1934. Figure 2d shows that *P. apetala*, which appears frequently in wildfire regeneration sites in Tasmania

(Hickey 1994), is widespread throughout the plot, the only sparse area for that species being an approximate 10 x 10 m square located between the 30 & 40 metre markers in both the X and Y coordinates. In this same area are three sassafras (*A. moschatum*) trees, the largest of which has a diameter of 17.5 cm. This small size compared with the maximum diameter of sassafras in 'Old growth' (80 cm) and in '1898' (50 cm) is consistent with the fact that the more recent fire in 1934 has retarded its establishment and growth, although some degree of secondary regeneration of this rainforest species does occur in Tasmanian mixed forests (Hickey 1994). Similar observations may be made about myrtle (*N. cunninghamii*), which has 155 stems in the '1898/1934' plot but they tend to be much smaller than those in 'Old growth' or '1898' (Table 1). Along with sassafras, myrtle appears more frequently in the right-hand half of Figure 2d than in the left-hand half. Furthermore, leatherwood (*Eucryphia lucida*), a species that likes high rainfall and low fire frequency, is also more concentrated in the right-hand half of Figure 2d than in the left-hand half. This suggests that either the 1898 fire or the 1934 fire, or both, may have been less intense in the right-hand half of the '1898/1934' plot than in the left-hand half.

CONCLUSIONS

We have shown here that gathering information on the occurrence, size and location of the vascular plants of a forested area can reveal additional information about the forest's fire history. Of particular interest was the fact that previous assessments of the fire history of the Bird Track plots, based upon earlier maps of the fire history and on fire scars on *E. obliqua* trees, did not discover that there was a second fire in part of the '1898' plot. Although one could count the number of stems of each vascular species present, and list them without mapping them, it is unlikely that a mere listing would reveal the underlying anomalies. The visual impact of the map of the vascular plants also leads to a greater appreciation of how wildfire affects the distribution of the vascular species within the plot and has the potential of revealing further aspects of the fire history. We have seen that the '1898/1934' plot is not homogeneous with respect to its vascular plant composition, and that this probably has its explanation in its fire history, resulting in half of the plot having many more rainforest species than the other half. In the absence of the mapping of the positions of the trees, it is unlikely that this implied difference between the fire intensities in differing portions of the plot would have been detected. Mapping also helps to highlight the erratic nature of a wildfire that is not stand-replacing. Although editors of scientific journals, and their reviewers, like to emphasise the importance of replication in scientific research, the great variability in floristic composition that exists in Tasmanian forests renders it almost impossible to achieve satisfactory replication of plots within a given forest type. Dividing a plot up into subplots is generally frowned upon, as it is rightly considered to be pseudoreplication. However, measurements made on the individual trees within the subplots may reveal major differences among the floristic composition or stand structure at the subplot level. Correlating these differences with other measurements made in the subplots, such as the species richness or diversity of its fungi, mosses or liverworts, for example, is one way of obtaining useful scientific information from forest plots when satisfactory replication of a given forest type is not possible.

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MONITORING OF FLAME ROBIN (*PETROICA PHOENICEA*) AND SCARLET ROBIN (*PETROICA MULTICOLOR*) FLOCKS APRIL TO JULY 2009 TO 2014, IN SOUTHEAST TASMANIA

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INTRODUCTION

For some years, concerns have been raised about the possible decline of flame robins in Tasmania. It was decided to investigate flame and scarlet robin populations in southeast Tasmania to establish whether decline was occurring. Observers had suggested a drop in numbers during the winter period when flame robins flock together having moved away from their breeding areas. Unless one is familiar with the areas robins frequent during the colder months, it would be understandable to assume that flame robins had declined.

A reduction in the number of males is assumed to be part of the decline. However, this could be explained by the fact that the males may recede into brown plumage after the breeding period and regain their adult plumage again in spring. Photographic evidence was collected on transitional plumage (see Plates 1-3). This transitional phase of males requires further analysis to determine if these birds are transitioning from immature to mature or whether the males had been in eclipse.

It is also possible and has been suggested that flame robins may migrate to Victoria. For example: "some Tasmanian birds annually migrate across Bass Strait" and are described as "sedentary, dispersive, migratory" (Pizzey & Knight,2003). (It is) "not certain whether part of Tas. breeding population migrates across Bass Str. to Vic." (HANZAB 2002). "Suggested that those seen crossing water in S. Vic., and claimed to be arrivals from Tas., probably moving from other areas in s. Vic." (HANZAB,2002). Analysis of extensive banding records on Flinders Island by Bill Wakefield and later by Alan Reid, as well as re-trap records from the Australian Bird and Bat Banding Scheme would be needed to further investigate migration of flame robins.

METHODS

In 2009 research across extensive areas where flame robins might congregate in flocks during winter began. During April, a day's trip would sometimes have no robins or very low numbers. As the months progressed, the numbers increased, peaking in June and July. Flame robins were observed to favour fairly level, north-facing, open grassy fields, surrounded by low shrubs for shelter. Surrounding bushland, hills or farm buildings were often favoured for wind breaks but robins commonly fed in grassy, fenced farm areas away from other vegetation.

Eventually six suitable sites were established to regularly check for flocks from April to July, utilising routes that could be comfortably counted by car in a day. This included four routes to check on a monthly basis (Blackbrush, Brown Mountain, Runnymede and Tooms Lake) and two larger routes to check once each winter (Bruny Island and Tasman Peninsula) to obtain maximum numbers of flame robins present during those months.

Counts were undertaken with binoculars from the car or with a telescope if the birds were further away to obtain accurate identification

and numbers. Occasionally two people would count a flock and compare numbers afterwards. Sometimes males and females were divided between counters. Extra large flocks that were fairly sedentary would be counted twice to verify results.

Although flame robins tend to congregate in flocks outside the breeding season, pairs of scarlet robins are often also present in these flocks. Numbers of both robins were counted separately. Robins were usually feeding on insects and often moved across the fields so care was needed to avoid multiple counts.

Surveys were conducted by Bill Wakefield and Els Wakefield until 2011 when Bill died. Els continued the research up to 2014. Analysis includes data collected from the six selected sites surveyed from 2009 to 2014.

RESULTS

Flame robins

Suggestions that flame robins have undergone a decline in Tasmania do not appear to be represented in the data collected. Figure 1 shows the fluctuations in number of flame robins from each of the six sites. Although the fluctuations from 2010 to 2011 are dramatic, the 2012 recovery and consistent counts from 2012-2014 suggest that this may be part of a natural cycle. It appears that 2010 was an exceptionally good year for flame robins.

In 2011 the collection of data was limited but data collected in 2011 does show a drop for the Blackbrush, Brown Mountain and Runnymede areas, a drop that may have occurred at all sites during this period.

Examination of flock size in 2009 and 2014 (Figure 2) shows that, despite the year-to-year variability shown in Figure 1, the number of flame robins counted in winter flocks remained relatively stable throughout the counting period, except at Blackbrush. This site shows a significant increase in numbers during this period. The reason for this increase is unclear but may reflect a count early in the season, prior to the major arrival of flame robins in 2009.

Scarlet robins

Flocking behaviour is not demonstrated in scarlet robins, rather during winter they associate with flame robins, which do exhibit flocking behaviour. The scarlet robins may be there for safety in numbers or for the presence of food and shelter, but they often accompany flame robins during the colder months. Figure 3 suggests that the number of scarlet robins fluctuated in their incidental presence among the flame robin flocks. Therefore, this may not be the best method of monitoring scarlet robin populations, as individuals are dispersed from their breeding areas.

CONCLUSION

In conclusion, the use of these six routes to regularly and systematically record flame robin numbers in southeast Tasmania for a period of five consecutive years has demonstrated that flame robin numbers appear to be generally stable.

ACKNOWLEDGEMENTS

Thanks to Hazel Britton for her support and assistance with a count after the death of Bill Wakefield and to Angus McNab for his invaluable help with collating of figures.

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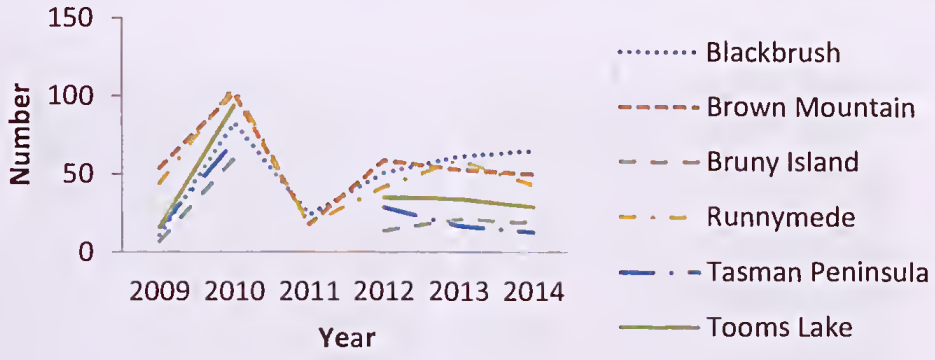

Figure 1. Winter flocks of flame robins recorded from 2009-2014

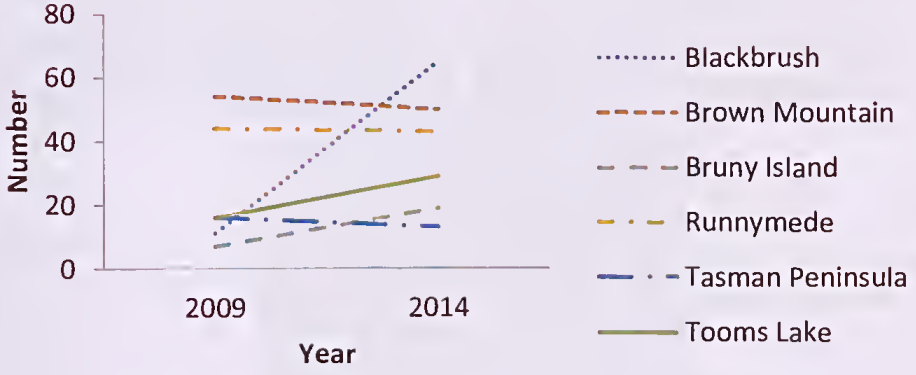

Figure 2. Comparison of winter flocks of flame robins in 2009 and 2014

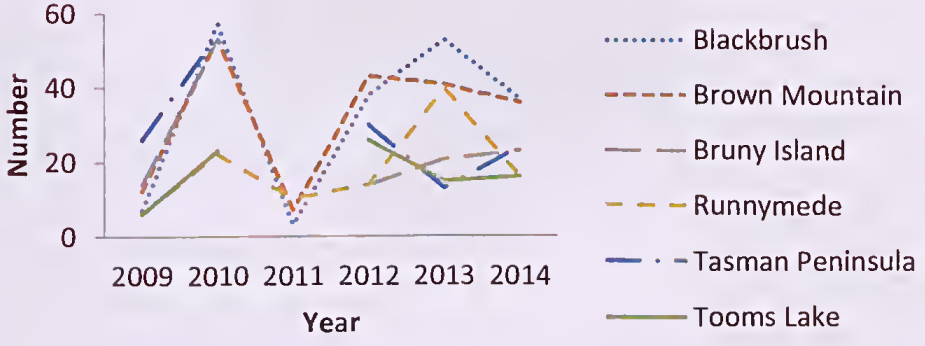

Figure 3. Winter flocks of scarlet robin recorded from 2009-2014

Plates 1-3. Flame robin (all images: Els Wakefield)
Top left: male
Top right: female
Bottom: transition

NOTES ON CAPTIVE HOUSING AND GENERAL HUSBANDRY OF SELECTED LUCANID BEETLE LARVAE

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To aeeurately doeument the life history of Coleoptera, it is often neeessary to augment field observations with laboratory-based researeh. Through trial and error, over a period of 13 years, we have sueeessfully reared, or eaptive bred, a range of beetles ineluding speeies of Lueanidae (stag beetles), Carabidae (ground beetles), Buprestidae (jewel beetles), Cerambyeidae (longieorn beetles) and Cureulionidae (weevils).

When searehing for beetles in the field, we all too often loeate larvae not aeeompanied by identifiable adults. While it may be possible to elassify the larvae to family level, many beetle larvae have not been deseribed and related speeies often display very similar external features. There are a number of publieations and websites delivering adviee on eaptive rearing of invertebrates (e.g. Upton & Mantle 2010), but many are speeies-speeifie or provide insuffieient detail. In this artiele we offer our adviee on the housing and eaptive maintenanee of larvae of a popular group, the Tasmanian stag beetles, for data eolleetion and rearing of imagines for positive identifieation.

In Tasmania, the stag beetle family Lueanidae is represented by five genera: *Hoplogonus*, *Lissotes*, *Ceratognathus*, *Syndesus* and *Lamprima*, all of whieh have been found by us to adapt well to captive husbandry. The larva of most of the genera are saproxylie (deeaying wood-dependent) or oeeupy the interfaee between soil and deeaying wood, however, some are edaphie (soil-dwelling). The following adviee is applieable for the maintenanee of lueanid larvae utilising these mierohabitats.

COLLECTION AND TRANSPORT

A ready supply of suitably-sized plastie vials is neeessary when eolleeting larvae in the field. Speeimens are best transported individually and the ehosen eontainer must be filled with substrate (soil or deeaying wood) to avoid any movement whieh may eause injury. However, multiple larvae may be transported together provided there is suffieient spaee and substrate to ensure separation. Zip-loek plastie bags are useful for eolleetion and transportation of habitat media. A eool, shaded environment is eritieal in transit and we have found an esky or similar insulated eontainer to be invaluable.

The period between eollection and re-housing of subjeets should be kept to a minimum. Field notes reeording the date, loeation eo-ordinates, forest type and mierohabitat details, ineluding substrate moisture level, will assist in replieating an appropriate eaptive environment and are neeessary when labelling any voueher speeimen.

HOUSING, SUBSTRATE AND COVER

Glass or plastie aquaria, plastie storage eontainers and take away eontainers are all aceeptable for housing lueanid speeies (Plate 1). Striet hygiene measures must be applied to ensure that the ehosen vessel is free of any eontaminant that may eneourage the growth of mould, or any ehemieal residues, both of whieh may prove to be injurious to the oeeupants. The chosen eontainer should be of suffieient volume (see below) to provide for the natural burrowing eapaeity of the targeted speeies while remaining small enough to allow for easy maintenance and periodie observation of the oeeupants. A elose-fitting, but not airtight, lid is neeessary to maintain a eonstantly moist environment and frequent

monitoring must ensure that the level of moisture suits the needs of the larvae, which varies between species. Containers housing larvae must be kept lidded at all times to exclude macropterous parasites. Always house larvae away from sunlight in an environment where minimal temperature change occurs (to mimic shaded forest ground temperature).

Plate 1. Examples of containers prepared for rearing lucanid larvae

Substrate media needs to mimic that from which the subject was collected (i.e. soil or decaying wood) and is best collected from the point of capture. Some larvae live for multiple years. Therefore additional substrate should be collected to ensure a ready supply is available for replacement when it is considered that the level of faecal pellets has become too great and may present a health risk to the occupants. Prior to housing larvae, all substrate medium should be thoroughly searched to remove predators, visible animals or eggs, as these may in some way interact negatively with the chosen subject. Stones and any other hard objects should also be removed as these may cause injury to the occupants when substrate is removed for periodic maintenance or observation. Additional substrate is best stored in a sealed container in a cool dark place.

Lucanid larvae pass through three instars (growth stages) prior to pupation. Therefore, the depth of substrate may need to be increased as the occupants develop as they require a greater volume in which to tunnel to obtain nutrients. A reliable measure of the necessary volume per larva is four times the body thickness of the larval instar in depth, covering a surface area of not less than ten times the area occupied by the larva (more may be added, however early instar larvae are difficult to locate for monitoring in an "ocean" of substrate).

Multiple lucanid larvae can be housed in a single container of sufficient size as they maintain a safe distance from one another by means of sound vibrations produced by the rubbing together of stridulatory mechanisms located on the legs (Richards & Spencer 2014); however, the risk of injury and possible stress of overcrowding will undoubtedly increase incrementally. Larvae produce faecal pellets in large quantities and subsequently when housed communally will require more frequent substrate renewal.

Many lucanid larvae are interface dwellers, requiring a section of decaying wood beneath which they feed and often construct a network of tunnels through the soil connecting to the decaying wood above. As with the chosen substrate, this wood must be thoroughly searched for any organisms that may present a threat to the occupants. Saproxylic (log-dwelling) lucanids are usually found inside rotting logs and will complete their life cycle in captivity as long as adequate decaying wood of a suitable decay class is maintained and moisture/temperature level fluctuation is minimal.

MAINTENANCE AND HANDLING

Moisture level is best maintained using a spray bottle. When misting with water, ensure that only rainwater is used; tap water in most instances is unacceptable due to the chemical additives (fluoride, chlorine, etc.) which may be injurious to the growing larvae.

Specimens should only be handled when absolutely necessary and never with bare skin

due to the presence of naturally occurring chemical compounds and bacteria. Surgical gloves must be worn if animals are to be handled. It is far more acceptable, however, to use a clean plastic spoon or similar tool, ensuring that no sharp edges are present (edges can be rounded with glass paper or equivalent). Early instar larvae are very delicate and are best handled by gently rolling them into and out of the spoon; forceps must never be used as invariably the animal will be maimed. Larvae will chew at each other if kept in confined space even for a short time with no substrate to separate. On returning any specimen to the substrate an indentation deeper than the body should be made, into which the animal is deposited before replacing the covering decaying wood or other material.

At the onset of pupation the pre-pupae of most lucanid species seal themselves inside a pupal cell formed by the compaction of substrate and faecal pellets. Continuous bodily contortions mould the material into a solid wall, creating a strong structure of sufficient internal dimensions inside which the animal can safely pupate. Note that exoskeletal deformities in adults are caused by irregular, hard obstacles protruding into the cell.

Lucanid pupae are particularly susceptible to trauma and great care must be exercised if it becomes necessary to handle or move them (spoon is the only safe option). Pupation length varies between genera, but approximately 14 days prior to eclosion, the cheesy colouration begins to gradually darken until the pupa assumes a rich chestnut colour in the final week of pupation. Newly eclosed, (teneral) imagines retain this colour for a number of days. They are very fragile and must be treated with the same extreme care until fully hardened and darkened to adult pigmentation over a period of up to 10 days.

When periodic inspection necessitates the exhumation of animals, the surface onto which the substrate is poured must be thoroughly cleaned or replaced if any animals are found to be diseased or dead, likewise any substrate in contact with a suspected diseased animal should be discarded. Great care must be taken when disturbing pupal cells as any substrate material entering the smooth cell interior will lead to deformities in the imaginal exoskeleton. We have adopted the practice of covering a damaged pupal cell with clean moulded cardboard prior to covering with substrate.

Cold light should be used when photographing animals and exposure to air and unnatural surfaces must be minimised.

MORTALITY IN CAPTIVE AND NATURALLY OCCURRING LUCANID LARVAE AND PUPAE

Mould

Both powdery white and powdery blue/green types of mould are often found on dead specimens (Plate 2). We are uncertain if the mould is the cause of death or manifests on the decaying carcass, however, it is often found on both larvae and pupae. A different white mould, which is quite solid and moist, has been recorded on dead adult lucanids; again it is unclear if it is the cause of death.

Nematoda

Nematode worms are undoubtedly the greatest cause of death to captive larvae. It is unknown if they are present in the animal when captured or transported in the habitat medium, however, vast quantities are to be found inhabiting corpses of both larvae and pupae in captive and wild populations. Species found in decaying wood seem to be more susceptible than those living in soil or the wood/soil interface.

Collembola

At times, large numbers of Collembola are present. As with nematodes, it is not clear if they cause death or simply feed on the

deeaying eorpse; however, we have found them in huge numbers on and inside dead larvae and pupae both in wild and eaptive individuals.

Acarina

Mites are also often found, at times in large eoneentrations, both on eaptive speeimens and larvae and pupae in the natural state. It is not known if these infestations eause the death of the animal, however, they are found to infest the eorpse (Plate 3).

Carabidae

We have recorded adult and larval earabid beetles feeding on lueanid larvae in both eaptive and natural situations. Great eare should be exereised to ensure that any substrate medium obtained from the environment is free of these predators.

Lithobiomorpha

As with the predators mentioned above, great eare should be taken to ensure that eentipedes are not aeeidently introduced with the substrate medium. These invertebrates are voraeious predators and will kill larvae far in exeess of their own weight.

Parasitism

Taehnid flies and the tiphid wasp *Thynnus zonatus* parasitise lueanid larvae. Gordian worms (*Gordius* spp.) have also been reeorded utilising lueanid larvae as hosts. But by far the strangest observation so far has been that of mieroseopie parasitie worms inhabiting the seeond antennal segment of some larvae.

Bacteria

Baeterial infestations have oeeasionally been observed in the guts of naturally oeeurring larvae, leading to death. Larvae displaying bodies inflated with elear liquid and laeking food in gut (Plate 4) should not be ehosen as eaptive subjeets.

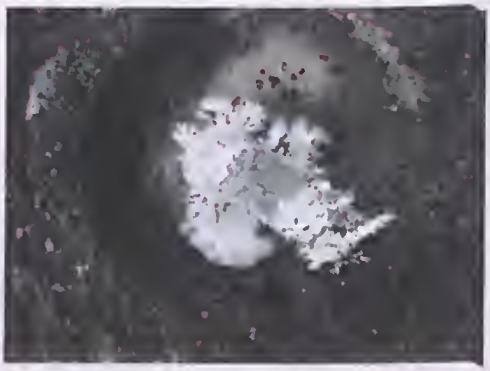

Plate 2. *Lissotes obtusatus* larva consumed by mould

Plate 3. *Hoplogonus simsoni* pupa infested with mites

FINAL WORDS

Understanding and doeumenting the eomplete life history of any speeies is an extremely satisfying and rewarding exereise. The benefits are not just personal, but may serve to enlighten the wider eommunity and provide neeessary knowledge to improve environmental outeomes for the speeies. The above suggested methods should serve to ensure the sueeessful eaptive rearing of lueanid larvae and, with slight modifieation, may also be applied to many other eoleopteran speeies.

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Plate 4. *Lissotes rudis* larva infected by bacteria

AUSTRALASIAN BITTERN (*BOTAURUS POICILOPTILUS*) SIGHTINGS IN THE LOWER DERWENT MARSHES

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In Australia, the Australasian or brown bittern (*Botaurus poiciloptilus*) is also called the bunyip bird because its call, a deep "woomph". The New Zealand bittern (*Ixobrychus noveazealandiae*) also has a Maori name "Kaoriki". It is endemic to New Zealand but has been extinct since the 1980s. I love the way the Maori name matches the sound of their call. This is also true for the great bittern *Botaurus stellaris* of Europe called "Roerdomp" in the Netherlands and "Aderyn y bwn" (the booming bird) by country folk in Wales. Its call is thought to be the farthest carrying bird sound in nature.

Australasian bitterns (Plate 1) have been reported from the Derwent Marshes for some time and a local resident in Dromedary has often mentioned hearing them call from a nearby island and upstream from her home. Recently she told me that there was a small launching spot near her home so I decided to explore the area with my kayak and invited my friend Mona Loofs-Samorzewski to join me.

We put the kayak on my roof rack on New Year's Eve and on 1 January 2016 we set off in the dark. We launched on the northern side of the river at first light in still conditions, immediately heading upstream.

We could hear many common bronzewings (*Phaps calcoptera*) calling in the area and were starting to wonder if these calls might have been mistaken for Australasian bitterns. Eventually, after searching along the island and river bank without success, we headed across the river to the Motor Yacht Club of Tasmania launching area where we went ashore for a snack and a rest.

It was at that point that we heard the unmistakable deep, loud booming call of an Australasian bittern. We immediately jumped back into the kayak and crossed the river to where the sound had come from, paddling right up to the bird standing among the reeds. It stood for a while, watching us carefully, giving us a clear view of its whole body and its bright blue face; an adult in breeding plumage. It was a breath-taking sight! As we slowly drifted downstream, it flew ahead of us, repeatedly landing along the river bank, either on a stump or a tree, trying to blend with the vegetation whilst keeping an eye on us. Watching the slow, heavy flight of the bird was a thrill. Finally, it landed behind the reed bed, well away from the river, disappearing from view. We felt that this had been a perfect start to the New Year.

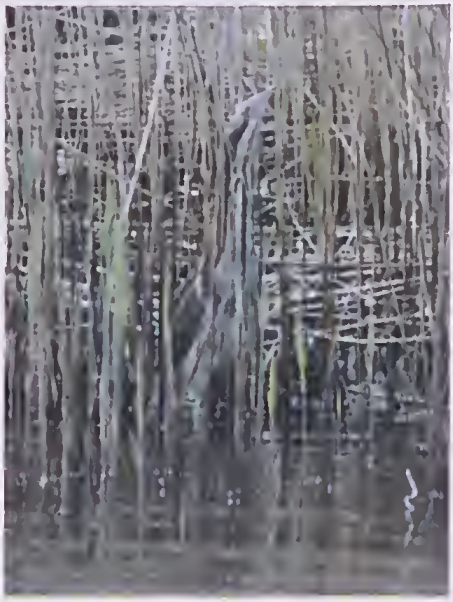

Plate 1. Australasian bittern in Derwent estuary (image: Luke Einoder)

On 24 April, another birding friend, Angus McNab, contacted me for details of the launching area. I offered to show him the location instead and together we headed to the site at first light. This time the wind was blowing at about 20 knots and there was quite a chop on the river. However, the launching area was fairly sheltered so we decided to stick close to the reeds along the shoreline and headed upstream. Again, due to the splash, we decided not to risk our cameras and Angus had not expected to see the bird, merely to learn where to look in future.

Almost opposite the Motor Yacht Club launching area, I spotted a bittern standing very still close to the edge of the river. Angus let out a cry of disbelief as he saw his first Australasian bittern. This bird was not in breeding plumage but was a beautifully streaked bird. It stood watching us but keeping very still. We paddled carefully upstream and past it before drifting down to have a closer look. The bird stretched to its full length, raising its bill upwards in an effort to blend with the surrounding reeds. Eventually it flew downstream and disappeared from sight. In our excitement we made a high five, a traditional celebration of a new bird.

Paddling back to the car, we came across a platypus (*Ornithorhynchus anatinus*) on the water close to the kayak. It took one look at us and dived. This was followed soon after by a water rat (*Hydromys chrysogaster*) swimming across the bow. It must have decided to head back to shore and we had excellent views as it swam back directly below the kayak. As the water was shallow and clear, we could see the long white end of its tail, the best view I had ever had of this species and my first in daylight. To our surprise, a second water rat swam past soon after. This one seemed to have lost some of its tail as the white part was quite short. Finally, just before landing, I noticed a little penguin (*Eudyptula minor)* on the water, an unexpected sighting so far up the Derwent River and a fun ending to an eventful morning filled with wildlife.

OTHER SIGHTINGS

Alister Donnelly commutes to and from his work in Moonah, driving along the Derwent Marshes and wetlands in the early morning and late at night.

On 7 March 2010 he saw an Australasian bittern flying over the river near Rowbottoms Road, Granton.

Some time shortly after this he saw two Australasian bitterns flying one following the other at a spot he measured as 7.8 km up river from the intersection of Lyell, Midland and Brooker highways. (This is only a few hundred metres from our more recent sightings in 2016).

On 2 January 2011, Alister found a juvenile Australasian bittern killed on the road at a spot he measured as 8.5 km upstream of the Lyell, Midland and Brooker highways intersection. He photographed this bird on 2 & 3 January 2011. Images of the whole animal, the head and underside of each wing showing erupting pin feathers, indicated that the specimen was a juvenile (Plates 2-4). This dead bird was possibly only a kilometre from the Motor Yacht Club.

Luke Einoder: In 2013/14 (October to March) Luke Einoder developed and implemented a monitoring programme for Australasian bittern in the upper Derwent estuary wetlands for The Derwent Estuary Programme. The results were forwarded to Andrew Silcocks from Birdlife Australia.

The survey area was from Norske Skog to the Bridgewater Bridge. During the 2013/14 survey (October to March) Australasian bittern were detected on seven occasions, four from water-based boat/kayak transects and three from positive responses to point-based nocturnal acoustic playback surveys (from

20 x 50 minute surveys at a number of sites around the upper estuary). Luke's feeling was that the extensive *Phragmites* in this area supported at least four breeding pairs in 2013/14. The Derwent is thought to be vital habitat in the southeast region, a permanent water source that provides a refuge that in dry years may contain a larger number of breeding pairs. He added that managing river flows to maintain healthy *Phragmites* is vital to support the frogs, fish and mammals upon which Australasian bittern feed.

Luke witnessed a bittern flushed from one side during the day fly across and up river about 400 m. He said that a multi-year survey with tracking to establish home range size in varying years would be extremely valuable.

ACKNOWLEDGEMENTS

Thanks to Mona Loofs-Samorzewski and Angus McNab for accompanying me in the kayak as I could not have done it without them. Thanks to Alister Donnelly for his photographs and details of his observations and thanks to Luke Einoder for his photographs and details of his monitoring program for Australasian bittern in the Upper Derwent Marshes.

Plates 2-4. Juvenile bittern killed on Lyell Highway (all images: Alister Donnelly)

HIGHLIGHTS OF PELAGIC BIRDING OFF EAGLEHAWK NECK 2015/2016

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This is the fifth in a continuing series of articles summarising the highlights of pelagic seabirding off Tasmania's coast (Wakefield 2012; Wakefield & Brooks 2013; Wakefield 2014; Brooks 2015).

Since the previous report in *The Tasmanian Naturalist* (Brooks 2015), there have been some very exciting seabird trips from Eaglehawk Neck. They have been a mixture of trips led by local birders, which attract birders from interstate and overseas, as well as trips led by Birdlife Australia and a few private tour companies. In the past, there were only about four trips per year and mostly in the summer months. Since 2011 Tasmanian pelagics have been held regularly throughout the year, collecting valuable data and exciting new records. All trips were on the *Pauletta*, skippered by John Males and leaving from Pirates Bay jetty, Eaglehawk Neck.

2015

The first trip was on 4 July 2015 led by Ros Jessop. The trip was in strong westerly winds after being hit by a front soon after arriving at the shelf. Rob Hamilton provided details and excellent photos of the highlight birds. Two Antarctic tern (*Sterna vittata*), one of which was an immature and the other in non-breeding plumage, were the birds of the year as these were just the second record for Tasmania and the fourth for Australia, an outstanding record ("a dead-set mega", Plate 8). Other highlights included three blue petrel (*Halobaena caerulea*) (Plate 1), an exciting bird that has been seen more frequently in Tasmanian waters and has attracted visitors hoping to add them to their list.

There were also ten Cape petrel (*Daption capense*), a frequent visitor to Tasmania in colder months and a joy to watch as they wheel in a group with easily identifiable chequered patterns on the backs of the birds.

Plate 1. Blue petrel

Among the 50 fairy prion (*Pachyptila turtur*), an Antarctic prion (*P. desolata*) and two slender-billed prion (*P. belcheri*) were also identified. The grey petrel (*Procellaria cinerea*) (Plate 2), an uncommon visitor during winter, was also recorded.

Plate 2. Grey petrel

On 18 July 2015, Rohan Clarke reported that very cooperative five blue petrel and six grey petrel were the highlight of the day but other birds included two slender-billed prion and two Antarctic prion and a nice selection of great albatross. A soft-plumaged petrel (*Pterodroma mollis*) would have been a highlight if it had been more than a speck on the horizon!

The following day, 19 July 2015, Rohan led a second trip commonly referred to as a 'double-header'. Possibly due to a change of wind to the northwest, the hoped for blue petrels and grey petrels seen on the previous day were missing but in their place a nice adult Salvins albatross (*Thalassarche salvini*) (Plate 3) was the bird of the day. Other good birds included slender-billed prion and Antarctic prion as well as good numbers of albatross generally. A white-chinned petrel (*Procellaria aequinoctialis*) was notable as it is usually a summer bird.

Plate 3. Salvins albatross

On 15 August 2015, Paul Brooks led the trip and I was on board. The trip included a close fly-by from a light-mantled albatross (*Phoebetria palpebrata*) followed by distant views of a sooty albatross (*Phoebetria fusca*) (Plate 4). The two were initially thought to be the same bird but were later separated out from photos. Other highlights were a northern royal albatross (*Diomedea sanfordi*), a single Salvins albatross (*Thalassarche salvini*), seven slender-billed prion and three grey petrel.

On 29& 30 August 2015, there was another double-header led by Nikolas Haass. I was on both trips. On the Saturday we could not believe that the trip would go ahead due to the rough seas but the skipper took us out as far as the Hippolytes. Here he saw that the huge waves were too close together so we returned to the jetty.

Plate 4. Sooty albatross

The following morning, the bay was still white aeross and we arrived at the jetty fully expecting that the trip would be eaneelled. We managed to reach the shelf however and, fortunately, the wind, squally rain showers and two to three metre seas deereased during the day. Some on board declared it one of the best pelagies ever experieneed. This was despite the eold and that most on board suffered from seasiekness. Highlights ineluded three light-mantled albatross, five southern royal albatross (*Diomedea epomorpha*), two blue petrel, four slender-billed prion, two Antaretie prion, four grey petrel, 25 white-headed petrel (*Pterodroma lessonii*), a soft-plumaged petrel, 50 great-winged petrel (*P. macroptera*) and ten grey-baeked storm petrel (*Garrodia nereis*)!

In addition, the skipper and his son Michael, who was the deek-hand, reported seeing a killer whale (*Orcinus orca*).

There were two pelagics on 12 & 13 September 2015, both organised by Rohan Clarke, who compiled the reports. On Saturday the 12th there were very pleasant seas for a Tassie pelagic but the hoped for cold water specialities failed to materialise. As Rohan reported, "With the appearance of a Long-tailed Jaeger and an Arctic Jaeger (*Stercorarius longicaudus* and *S. parasiticus*) and White-chinned Petrel, spring had sprung!". The long-tailed jaeger was an immature bird and only the third record off Eaglehawk Neck since 2009. It was also an early record with all previous Eaglehawk records being in the period November to February. A highlight was a close fly-by of a possible second year Arctic tern (*Sterna paradisea*) (Plate 5) in primary moult but the identification of this bird remains unresolved to some, who believed it possessed features of an Antarctic tern. The southern and northern royal albatross on the water at the back of the boat were also nice. There was also one slender-billed prion and a small patch of feathers on the right upper wing demonstrated it was the same bird throughout the day.

Plate 5. Arctic tern

Sunday 13 September 2015 was a quieter day than the Saturday as is often the case when the wind is from the north. The highlight was the northern royal albatross on the water at the back of the boat for an extended period and the juvenile southern giant petrel (*Macronectes giganteus*) which Rohan described as uncommon these days.

On 11 October 2015 I was invited to join a pelagic from Eaglehawk Neck organised by Birdlife Warrnambool. Despite calm conditions, three to four participants were sick with symptoms described as ranging from mild discomfort to near comatose. This time we had three southern giant petrel as well as five northern giant petrel (*Macronectes halli*). Eight Wilsons storm-petrel (*Oceanites oceanicus*) were counted, a high number compared to only a single white-faced storm-petrel (*Pelagodroma marina*) and three grey-backed storm-petrel (*Garrodia nereis*). Other highlights were two southern royal albatross, no less than eight Campbell albatross (*Thalassarche impavida*) and two black-browed albatross (*T. melanophris*). There were up to 150 fairy prion. The largest numbers recorded were of the estimated tens of thousands of short-tailed shearwater (*Puffinus tenuirostris*), some swimming underwater behind the boat after the berley. There were also two blue shark (*Prionace glauca*) behind the boat in the berley trail. During our return, at least five humpback whales (*Megaptera novaeangliae*) were observed, all migrating south, breaching and fin slapping.

There is a regular trip organised to include some visiting international birders while they are in Hobart for the annual CCAMLR (Convention on the Conservation of Antarctic Marine Living Resources). Last year it was on 17 October 2015. On the way out we travelled through an estimated 5,000 short-tailed shearwater which was an amazing experience. Other highlights were four southern royal albatross, four antipodean (Gibsons) albatross, (*Diomedea antipodensis gibsoni*), and no less than nine giant petrel comprised of two southern giant petrel and

seven northern giant petrel. There was a minimal swell with westerly wind that increased to gale force as we returned to Pirates Bay, where we saw two humpback whales.

On 4 November 2015 Chris Doughty led a trip for Peregrine Birding Tours. The highlights were a northern royal albatross, a single soft-plumaged petrel. An Unusual Record Report Form (URRF) has been submitted to BirdLife Tasmania concerning the sighting of three potential white-bellied storm-petrel (*Fregetta grallaria*). If accepted, this would be just the second accepted sighting in Tasmanian waters. The report must eliminate the possibility that the birds were not the very similar and more common black-bellied storm-petrel which, confusingly, can occur in a white-bellied form, before it is accepted.

On 22 November 2015 Inala Nature Tours organised a pelagic on which the highlights were a single mottled petrel and a single white-headed petrel as well as four southern royal albatross, three antipodean (Gibsons) albatross and two southern giant petrel.

The final pelagic for 2015 was on 5 December. This time I was on board again and remember the pod of about twenty common bottlenose dolphins (*Tursiops truncatus*) breaching around the boat. The wind increased during the day, reaching 25 knots, with the swell increasing to two metres with rising seas. Highlights were a southern giant petrel, five northern giant petrel, three black-browed albatross, a white-headed petrel and about 20 white-chinned petrel.

2016

10 January 2016, organised by Paul Brooks, stood out to me for the ocean sunfish (*Mola ramsayi*), we saw not far from the boat in clear pelagic water; some of us felt like jumping in for a better look! Highlights were two Goulds petrel (*Pterodroma leucoptera*), a soft-plumaged petrel and a northern royal albatross. Unfortunately, what would have been the best bird of the day, a Cooks petrel (*Pterodroma cookii*) was only identified a couple of days after the trip, from a photograph taken by Angus McNab.

On 29 & 30 January 2016, two Birdlife Australia pelagic trips were organised by Rohan Clarke. I felt fortunate to be on board the first day as Rohan's trips are very popular, however by the end of the day I was not so sure. As Rohan described it, "100% cloud with persistent rain throughout the day: mostly light but with a solid downpour for almost half an hour on the return leg. With respect to rainfall the wettest one-day pelagic I have ever done" This was the day of the flash flooding down the east coast of Tasmania and I felt relieved that the skipper could use the radar as the rain made it impossible to see the shore as we approached the harbour. It was like riding into a dark grey wall. At that point my camera died due to the extreme humidity and salty conditions on the boat! Despite conditions there were some fantastic highlights; Cooks petrel, Goulds petrel, white-necked petrel (*Pterodroma cervicalis*), which represents the fourth or fifth record for Tasmania, and a Bullers shearwater (*Puffinus bulleri*). The most exciting highlight of all, however, was a south polar skua (*Catharacta maccormicki*), just the second confirmed record for Eaglehawk Neck pelagics!

Amazingly there was no rain at all for Rohan's following trip on 30 January 2016 but I was not on board. Highlights were a trifecta of rare shearwaters for Tasmania. The best were two wedge-tailed shearwaters (*Puffinus pacificus*), an absolute mega for Tasmania which may well be a first, a sub-antarctic little shearwater (*Puffinus assimilis*), and Bullers shearwater. A long-staying long-tailed jaeger (only the fourth record for an Eaglehawk pelagic) and a brief but satisfying

Goulds petrel were also listed as highlights for the day.

The trip on 6 February 2016 occurred a week later and I was very fortunate to be invited onto this pelagic which was part of a Tasmanian tour with Phillip Maher. Luckily I managed a few photos of a petrel which was later identified as an intermediate form of Kermadec petrel (*P. neglecta*), a "mega-rarity" (Plate 7) and only the sixth sighting for Tasmania of this usually sub-tropical species! Further highlights were two beautiful wandering albatross (*Diomedea exulans*) (Plate 6), the largest and heaviest of the wandering albatross complex with the most massive bill, longer than all other species. A northern royal albatross made an appearance as well as a possible providence petrel (*Pterodroma solandri*), but this was unconfirmed.

Plate 6. Wandering albatross

A trip on 7 February 2016 followed Phil Maher's and was an interesting comparison for me to the previous day. Paul Brooks was the leader and the estimated 4,000 short-tailed shearwater were a feature inshore in the afternoon. The eight white-chinned petrel, six fluttering shearwater (*Puffinus gavia*), two Huttons shearwater (*P. huttoni*) and 17 white-faced storm-petrel made for an interesting day with light swells and gentle winds.

Paul led another trip on 20 March 2016 on which the confused swell left some feeling decidedly queasy; three were seasick. The southerly wind also picked up, approaching twenty knots at times. The water temperature was above 20°C, very warm for this time of year. This may have explained the presence of a billfish, which was thought to be either a striped marlin (*Kajikia audax*) or a swordfish (*Xiphias gladias*), that cut the surface a couple of times with its tail fin close to the boat in pelagic waters. There were also two shortfin mako sharks (*Isurus oxyrinchus*) around the boat. Birds of note were a northern royal albatross and a soft-plumaged petrel. Around midday, the wind dropped back to around ten knots and the swell dropped back a bit but remained lumpy and confused. I think we were all pleased to be back on land!

Plate 7. Kermadec petrel

Paul Brooks opened his report for the pelagic held on 8 May 2016, describing it as Sunday's ripper trip! Paul had inadvertently planned this one for Mother's Day and what a fantastic Mother's Day gift for all four of us mothers on board! An extra gift was the southern bluefin tuna (*Thunnus maccoyii*) that was caught and shared out on the way back! About 200 short-beaked common dolphin (*Delphinus delphis*) were sighted throughout the day including a large pod which cavorted around the boat in the afternoon, and followed us coming back to port.

There were three great bird highlights: two southern fulmar (*Fulmaris glacialoides*), one of which fed in the slick and circled the boat

for over an hour giving excellent views, a Westland petrel (*Procellaria westlandica*) (Plate 8) that approached the boat closely for a while, giving good views and, finally an Arctic tern that made a close but brief approach in pelagic waters, taking a morsel from the berley slick before dematerialising. A BARC (Birds Australia Rarities Committee) has been submitted for the Westland Petrel.

Plate 8. Westland petrel

Raja Stephenson organised two trips from Queensland for 28 & 29 May 2016. On the Sunday I was very lucky to be offered a seat as there had been a cancellation. Despite the almost constant rain and overcast conditions, this trip was declared the best trip ever by Raja's partner, Nikolas Haass, an experienced seabirder. We all agreed because the highlights were two southern fulmar, a sooty albatross, no less than five light-mantled albatross as well as two grey-headed albatross (*Thalassarche chrysostoma*), a juvenile and an immature bird, two Westland petrel and a Kermadec petrel! The Kermadec petrel (*Pterodroma neglecta)* is only the seventh record for Tasmania. A URRF, with photographs, has been submitted to Birdlife Tasmania by Elliot Leach.

The pelagic on 26 June, led by Paul Brooks, was hoped to be in very cold conditions but we left port in a very light breeze with a low swell and surprisingly mild temperature. We had heard rumours at the jetty that there had been reports of a group of southern fulmar inshore from the Hippolytes so the skipper headed in that direction. Indeed, we had a total of five southern fulmar there in a mixed flock, feeding and loafing on the water. This number of southern fulmar is most unusual for Tasmania where we normally see only one or two at the most. Two were later seen in offshore waters on the return to port but were possibly the same birds seen in the morning. Other highlights included two soft-plumaged petrel, two providence petrel, a white-headed petrel and a fluttering shearwater.

After landing, a photo was taken of all seven women on board in celebration of women as birders around the world.

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APPENDIX. BIRD SPECIES LIST PELAGIC HIGHLIGHTS 2016

PROCELLARIIFORMES

***Diomedeidae* Albatrosses**

1. wandering albatross (*Diomedea exulans*)
2. antipodean (Gibsons) albatross, (*Diomedea antipodensis gibsoni*)
3. southern royal albatross (*Diomedea epomorpha*)
4. northern royal albatross (*Diomedea sanfordi*)
5. light-mantled albatross (*Phoebetria palpebrata*)
6. black-browed albatross *(Thalassarche melanophris*)
7. Campbell albatross (*Thalassarche impavida*)
8. Salvins albatross (*Thalassarche salvini*)

***Procellariidae* Petrels, Shearwaters**

9. aouthern giant petrel (*Macronectes gigantcus*)
10. northern giant petrel (*Macronectes halli*)
11. southern fulmar (*Fulmaris glacialoides*)
12. Cape petrel (*Daption capense*)
13. blue petrel (*Halobaena caerulea*)
14. Antaretie prion *(Pachytila desolata*)
15. slender-billed prion (*Pachytila belcheri*)
16. fairy prion (*Pachyptila turtur*)
17. great-winged petrel (*Pterodroma macroptera*)
18. white-headed petrel (*Pterodroma lessonii*)
19. providence petrel (*Pterodroma solandri*) (un-confirmed)
20. soft-plumaged petrel (*Pterodroma mollis*)
21. Kermadec petrel (*Pterodroma neglecta*)
22. white-necked petrel (*Pterodroma cervicalis*)
23. Goulds petrel (*Pterodroma leucoptera*)
24. Cooks petrel (*Pterodroma cookii*)
25. grey petrel (*Procellaria cinerea*)
26. white-chinned petrel (*Procellaria aequinoctialis*)
27. Westland petrel *(Procellaria westlandica*)
28. wedge-tailed little shearwater (*Puffinus pacificus*)
29. Bullers shearwater (*Puffinus bulleri*)
30. fluttering shearwater (*Puffinus gavia*)
31. Huttons shearwater (*Puffinus huttoni*)
32. little shearwater (*Puffinus assimilis*)

***Hydrobatidae* Storm Petrels**

33. Wilsons storm-petrel (*Oceanites oceanicus*)
34. wrey-backed storm-petrel (*Garrodia nereis*)
35. white-faced storm-petrel (*Pelagodroma marina*)
36. white-bellied storm petrel (*Fregetta grallaria*) (un-confirmed)

***Laridae* Terns**

37. Aretie tern (*Sterna paradisea*)
38. Antaretie tern (*Sterna vittata*)

***Stercorariidae* Skuas**

39. south polar skua (*Catharacta maccormicki*)
40. Aretie jaeger (*Stercorariu sparasiticus*)
41. long-tailed jaeger (*Stercorarius longicaudus*)

MULTIPLE SPECIES FEEDING OF A PALLID CUCKOO (*CACOMANTIS PALLIDUS*)

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In an earlier paper (Hansson 2015), I reported on a pallid cuckoo being fed by black-headed honeyeaters which raised it, and also by scarlet robins, which also contributed as surrogate raisers.

The present article deals with a cuckoo chick which appears to have been fed by five different species. Typically, the cuckoo chick once it had fledged stayed in an area of about 200 m square but most of the time it did not move out of an area of 100 m square and was quite easy to find on each visit.

In the 2014-2015 instance of feeding by black-headed honeyeaters and robins, the cuckoo convinced the male scarlet robin to feed it by sitting at/on the nest occupied by the female scarlet robin and taking food the male brought to the nest to feed his egg-sitting partner. After the male took up a feeding role along with the black-headed honeyeaters, the female deserted the nest and also assisted with the cuckoo feeding.

While it is not possible to say definitely that only one cuckoo chick was involved in the observed feeding by five different species in the spring-summer of 2015-2016, it is probable because the bird was always found in a small area.

The initial-feeders were yellow-throated honeyeaters (Plate 1), then came black-headed honeyeaters (Plate 2), a male scarlet robin (Plate 3), strong-billed honeyeaters (Plate 4) and a grey shrike-thrush (Plate 5).

Plate 1. Yellow-throated honeyeater feeding manna to the pallid cuckoo chick

It appeared to be the persistenee of the euekoo flying to a bird whieh had just eaught a eaterpillar and pleading for food that caused so many speeies to beeome involved.

The female searlet robin did not beeome involved with the euekoo feeding this time but attempted to raise a family by building three nests but was thwarted eaeh time by the euekoo going to sit near the nest to keep the male on its feeding roster.

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Plate 2. Black-headed honeycater feeding the pallid cuckoo chick

Plate 3. Scarlet robin feeding the pallid cuckoo chick

Plate 4. Strong-billed honey-eater with pallid cuckoo chick

Plate 5. Grey shrike-thrush feeding pallid cuckoo chick

THE FIRST TASMANIAN RECORDS OF LESSER FRIGATEBIRD *FREGATA ARIEL* AND GREAT FRIGATEBIRD *FREGATA MINOR*

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In June 2016, coinciding with a very strong weather front coming down from the north, there was an amazing series of sightings of frigatebirds around Tasmania.

The first was at 12:30 on Monday 6 June 2016 by Mark Holdsworth and his partner, Sue Robinson, who live at Mays Point near Sandford. When Sue saw it, she was speechless with excitement and could only point. Mark has done many years of research on tropicbirds on Christmas Island and recognised it instantly but they could not believe their eyes. This was a female great frigatebird (*Fregata minor*). It glided past their property, harassed by forest ravens and heading south towards Cremorne, South Arm. Soon after, when Mark phoned me, he said that unfortunately it had been too quick for a photograph.

There was great excitement as word spread and many birders raced off to try and see the bird. However, although it was not seen again, a group of newly arrived banded stilt (*Cladorhynchus leucophalus*) was spotted at Lauderdale.

Later that day, Liz Znidersic reported on behalf of Eddie and Lesley Burns, that a lesser frigatebird (*Fregata ariel*), had been seen at Beerbarrel Beach, St Helens Point Conservation Area, flying back and forth over the coastline at approximately 11:30 am. Visibility had been down to only 150-200 m with mist but they had excellent views when the bird flew within 30 m overhead. As this sighting was an hour earlier than the sighting at Mays Point, this was in fact the first record of a frigatebird for Tasmania.

The next sighting I became aware of was on Thursday 9 June, with an excited phone call from Bruce Robertson in Victoria. Our mutual friend Garth Smith had just sighted a great frigatebird at 15:30 at the cattle yard at the Lady Barron wharf on Flinders Island. The bird had hovered overhead about 20 m above the ground before flying off. Garth did not get a photo. Bruce immediately phoned me to ask how to report the sighting. I then posted the frigatebird onto the Birdline Tasmania website.

That same afternoon of 9 June at 16:20 Liz Znidersic and Ian May took the first photographs of the frigatebirds in Tasmania. This was at Burns Bay, St Helens Tasmania, at the crest of the hill where there were five frigatebirds circling including two male lesser frigatebirds, one sub-adult female great frigatebird, one juvenile female great frigatebird and one adult male great frigatebird. Liz has sent me her story (below) and Ian has kindly allowed me to use his photos, which will now be recorded into history as the first photos of frigatebirds in Tasmania. (Plates 1-4, photographs taken by Ian May).

"While I was walking late yesterday afternoon (Thursday 9th June 2016) at Blanche Beach, I looked up and saw a frigatebird in the distance. The distinctive wing profile, long forked tail and the flash of white chest confirmed that it wasn't anything else. No camera in hand, car a few kms away, all spelt birding disaster, what was I going to do? With mobile phone in hand I called Ian May. Straight to the point: "I have seen a frigatebird, can you come with camera in hand?" Without an answer I knew he was on

his way, and I started to run towards the road to meet him, still trying to keep my eye on the distant frigatebird. When Ian picked me up 15 minutes later, I had lost site of the bird. We headed towards Beerbarrel Beach then looped back towards the Burns Bay boat ramp which was where I last saw the bird. We both then looked up to the crest of the hill and saw 5 frigatebirds circling. Excitement replaced words as Ian drove up the hill and we stopped, binoculars and camera in hand to see what species. The last light enabled a few photos; Lesser Frigatebird x 2 males, 1 x sub adult female Great Frigatebird, 1 x juvenile female Great Frigatebird and 1 x adult male Great Frigatebird". Liz Znidersic.

Plate 1. Great frigatebird, adult male

Plate 2. Great frigatebird, juvenile female

NB "Frigatebirds were first described in 1789 when they were named Lesser Pelican (*Pelecanus minor*). Under the rules governing scientific names, the specific name *minor* must stand, though a smaller frigatebird, Lesser, was later described" (Pizzey & Knight 2003).

Plate 3. Great frigatebird, sub-adult female

Plate 4. Lesser frigatebird, male

All photographs by Ian May

ACKNOWLEDGEMENTS

Ian May for kindly allowing me to use his photos for this article and Liz Znidersic for allowing me to include her story.

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NEW ECOLOGICAL AND BEHAVIOURAL OBSERVATIONS ON THE GREEN AND GOLD STAG BEETLE *LAMPRIMA AURATA* (SCARABAEOIDAE: LUCANIDAE) IN COASTAL TASMANIA

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INTRODUCTION

The distinctive green and gold stag beetles in the Genus *Lamprima* are widespread in humid coastal and near-coastal habitats from north Queensland to Tasmania, South Australia (*L. aurata*) and south west Western Australia (*L. micardi*), with endemic species on the oceanic islands of Lord Howe (*L. insularis*) and Norfolk (*L. aenea*). Another species (*L. imberbis*) is known from a single specimen collected many years ago in central coastal New South Wales and so far, all efforts to obtain additional specimens have failed (C. Reid pers. comm.) The genus is represented in New Guinea by *L. adolphinae* (C. Reid pers. comm; Suzuki 1995). The extensive range of *L. aurata* appears to represent a geographically varying cline with characters such as overall male size and mandibular length decreasing with latitude (C. Reid pers. comm; Mathews 1984; Suzuki 1995). Aspects of the life history and habits of *L. aurata* throughout much of its Australian range are poorly documented with the exception of Tasmania (Fearn 1996, 2015).

Tasmanian populations utilise the decaying subterranean root systems of a wide variety of dead trees and stumps as a larval food resource. Adults appear to have a very flexible trophic ecology and feed on sugary secretions and exudates of plants, typically the sap but also occasionally nectar-rich blossom and overripe fruit (Fearn 1996, 2015). Male *L. aurata* are unusual among the Lucanidae in having relatively small heads, dorsoventrally straight mandibles that meet when closed and a rounded, somewhat bulbous thorax. The large male mandibles can therefore act like a pair of shears enabling males to sever the shoot tips and flower heads of a range of adult host trees and shrubs, principally smooth barked *Eucalyptus* in Tasmania but also ornamental *Photinia* sp. and *Prunus armeniaca* (Apricot) (Fearn 1996, 2015).

In South Australia, *L. aurata* appears to have similar habits to Tasmanian specimens with larvae infesting decomposing subterranean timber and adults feeding on *Leptospermum*, *Eucalyptus* and *Acacia* (Matthews 1984). In addition, South Australian adults were reportedly very common on Australian hollyhock, *Malva preissiana* in the late 19th century (Tepper, 1887 as *Lavatera plebeja*).

Only male *Lamprima* display large, functional mandibles whereas those of the female being very small and appear to have no functional purpose (Fearn 2015). It is only males that are capable of severing or cutting plant parts to initiate sap flow and it appears that females are attracted to such food resources provided by males (Fearn 1996, 2015; Suzuki 1995).

The recent discovery of a dense congregation of adult *L. aurata* on a novel food plant in central northern Tasmania allowed close observation and photographic documentation of some of the feeding and mating habits of this species.

FIELD OBSERVATIONS

Over six days (30-31 Deeember 2015 and 3, 7, 10 & 21 January 2016) approximately 250 speeimens of the predominately purple/maroon 'eoastal form' of *L. aurata* were observed feeding, mating and male-male combatting on 11 mature speeimens of the 'eoast everlasting' shrub *Ozothamnus turbinatus* (Asteraceae) growing in sand dune scrub above the high tide mark at Beeehford, northeast Tasmania (GDA 94: 495382mE 5458497mN). This reeord represents a new adult host plant reeord for *L. aurata*.

Plate 1. Male of the purple/maroon eoastal form of *Lamprima aurata* lapping up sap after severing a flower head on *Ozothamnus turbinatus*

The peeuliar dark coloured eoastal form of *L. aurata* (Plate 1) has been doeumented previously (Fearn & Maynard 2015). The reasons for this apparently loealised form are unknown but may be related to temperature and humidity during the subterranean pupal stage in warmer, frost free coastal habitats or soil chemistry or both. To confound the issue even further, typical green-gold speeimens are also present but represent only a small peree ntage of the population in these coastal habitats. Speeimens of *O. turbinatus* with *L. aurata* feeding on them ranged from 1 to 1.5 m in height and from 1.5 to 4 m in width. All these shrubs were close to flowering and it was the eomposite flower heads at the end of individual shoots that appeared highly attractive to male *L. aurata*. Single males (Plate 1) or mating pairs (Plate 2) were feeding on sap and masticated buds on partially or entirely severed flower heads. A much smaller number of males had severed shoot tips without flower heads. Because of the compaet form and low maximum height of the *O. turbinatus*, it was eomparatively easy to observe and photograph the beetles' habits.

Plate 2. A mating pair of *Lamprima aurata* on *Ozothamnus turbinatus*. The male has used its enlarged mandibles to eut into the flower head exposing sap and pulp that the female is ingesting.

FEEDING HABITS

Male *L. aurata* were eommonly observed shredding flower heads or snipping them off with their powerful mandibles and then lapping up the sap (Plate 1). Males with females would move forward, over the top of their mate, to shred a fresh portion of flower head or eut stem and then retreat baek down the stem, allowing the female to feed on the freshly exposed plant material and exudates (Plate 3).

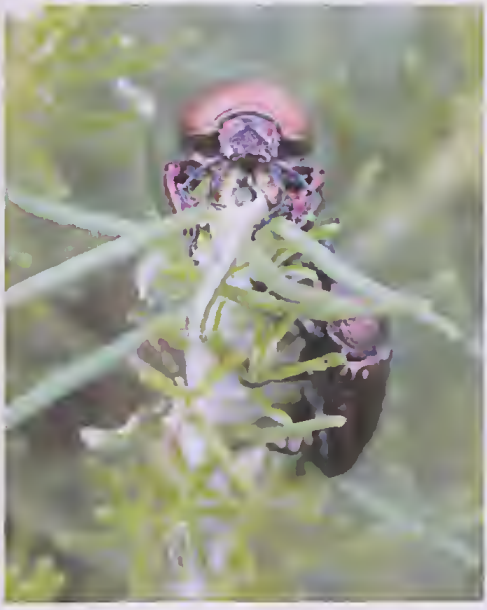

Plate 3. This male *Lamprima aurata* has elimbed to the top of a shoot where it had previously severed a flower head, to re-open the wound and stimulate fresh sap flow. Onee it had finished the male reversed down the stem and allowed the female to feed.

As reeorded previously (Fearn 1996, 2015) in 40 years of observing *L. aurata* in the field, the author has never observed females initiating or preparing any food resourees. Females ean feed on sappy exudations or neetar that do not require any male mandibular preparation, but are very rarely observed to do so. These Beeehford observations are further eompelling evidenee that females are mate-guarded and aetively fed by the aetions of the males during eourtship and eopulation, a period that ean last for several weeks (Fearn 1996). The tiny mandibles of the female appear to be non-funetional in terms of trophie eeology. It has previously been suggested that females find seent moleeules from freshly eut shoot tips provided by males to not only seek out a food souree but also a male partner (Fearn 1996, 2015). Observations at Beeehford supported this assertion. On three separate oeeasions lone females were observed flying around the erown of speeimens of *O. turbinatus* until they loeated the general vieinity of a male at a eut shoot tip. After alighting, these females methodieally sought out the eut shoot with attendant male and were immediately embraeed in the eharaeteristie mating posture (Plate 2). While females were feeding, the males appeared to be stimulating the females to eopulate by rubbing and vibrating their forelegs over the female's thorax (Plate 4).

Plate 4. A male *Lamprima aurata* stimulating the female to mate by rubbing its forelegs on the thorax of the female while it feeds on sap.

MALE COMBAT

As documented in previous field studies (Fearn 1996), males greatly outnumbered females at the Beechford site. In addition, all large males between 30 and 34 mm (mandible tip to elytra tip) were accompanied by females.

Large numbers of smaller males were flying around the *O. turbinatus* shrubs and methodically zeroed in on mating males or single males that were actively guarding or feeding on cut shoot tips.

Combat bouts were typically very brief (3-5 seconds), particularly if there was a marked size disparity between the combatants. Smaller males retreated rapidly if they were clearly outclassed and typically took to flight and circled around the shrubs looking for another opportunity.

Combat bouts were longer and more intense if individuals were more evenly matched in terms of size (Plate 5). Some bouts lasted for up to 20 seconds with the jousting beetles travelling up and down a stem in their efforts to succeed. The elongate mandibles of the male were not only used for direct biting but also as a wedge in an attempt to lever an opponent off the stem. One of the males would lower its head, angle the mandibles down and lunge forward under the head and thorax of its opponent while driving forward with its powerful legs and tarsi. Some males can be badly injured in such fights; the author collected several with limbs sheared off and one specimen that had an entire mandible sheared off at its base.

The author's discovery of the Beechford aggregation appeared to coincide with the main emergence period of *L. aurata* as specimens could be observed flying upwind toward the *O. turbinatus* from across the dune scrub land.

ACKNOWLEDGEMENTS

Thanks to Mark Wapstra for identifying the food plant, Dr Chris Reid (Australian Museum) for advice on the taxonomic status of the *Lamprima* group as well as reviewing the manuscript and David Maynard (Queen Victoria Museum & Art Gallery) for editing the manuscript. Special thanks to Akari Koyama for translating from the Japanese an obscure but important paper (Suzuki 1995).

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Plate 5. Two evenly matched male *Lamprima aurata* fighting for control of a shoot tip on *Ozothamnus turbinatus*

A NEW TASMANIAN HEMIPTERAN? A LARGE REPRODUCTIVE POPULATION OF THE CRUSADER BUG *MICTIS PROFANA* (HEMIPTERA: COREIDAE) ON THE CENTRAL NORTH COAST OF TASMANIA

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INTRODUCTION

The Hemipteran family Coreidae comprises some 57 species of large 'true bugs' (20-30 mm in length) in Australia. These bugs are typically elongate and stout-bodied with a segmented raised margin around the abdomen, which from above, makes the wings appear to be sitting in a depression (Zborowski & Storey 1995). In many species, the males have enlarged hind legs and the group emit an acrid-smelling defence chemical if carelessly handled. A common and large species in Tasmania that is typical of the group is the gum tree bug *Amorbus obscuricornis*, which can be observed feeding on the soft upper shoots of eucalypts during the summer.

Plate 1. Adult male (right) and female *Mictis profana* on young shoot tips of *Acacia longifolia* subsp. *sophorae* growing in dune scrubland at Beechford, northeast Tasmania. Note distinctive cross on hemelytra, orange antennae tips and swollen hind femora- particularly on the male.

One of the largest and most widespread species in Australia is the crusader bug (*Mictis profana*, Plate 1). This distinctive species is characterised by a pale yellowish cross on the hemelytra, orange tips to the antennae and large, expanded hind femora with spines on the hind tibia in males (Plate 1). *M. profana* occurs in all climate types throughout mainland Australia but has not been recorded in Tasmania (Flanagan 1994; *Atlas of Living Australia*). The species is extralimital from the Moluccas in Indonesia, New Guinea and east as far as Fiji (Gross 1991).

Favoured host plants in Australia are *Acacia* and *Cassia*; however, *M. profana* can also be a minor pest of citrus (Gross 1991). At least 22 species of plants in nine families have been documented as food plants including at least 10 species of *Acacia* (Flanagan 1994) indicating a level of trophic flexibility that may in part explain the wide distribution of this species.

FIELD OBSERVATIONS

During general field collecting of insects at Beechford on the northeast coast of Tasmania (Figure 1) on 30 December 2015, a mating pair of *M. profana* were observed on the uppermost shoots of a relatively young specimen of coast wattle (*Acacia longifolia* subsp. *sophorae*, Fabaceae) growing in sand dune scrub above the high tide mark (GDA 94, 495382mE 5458497mN). The author immediately recognised this species from previous encounters in Townsville, Queensland, and realised that in more than 40 years of collecting insects in Tasmania, he had never previously encountered *M. profana* in the state.

Subsequent inspection of *A. longifolia* subsp. *sophorae* over four day-long field trips (31 December 2015 and 3, 7 & 10 January 2016) revealed *M. profana* to be common in the vicinity of the initial collection site as well as east of the mouth of the Curries River for at least 1.3 km (Figure 1). A total of 38 specimens (20 males and 18 females) were collected (and many more observed) at various points along the coastline and lodged in the entomology collection of the Queen Victoria Museum & Art Gallery (Registration numbers QVM.2016.12.0001-QVM.2016.12.0038).

Figure 1. Beechford, northeast Tasmania, with locations where *Mictis profana* was documented and collected in the field marked in blue (sites further east or west have not been surveyed)

In addition to adults, many nymphs of various instars were observed (Plate 2) in the same locations as the adults. There appeared to be a distinct preference for *M. profana* to gather on low-growing, juvenile stems and foliage of *A. sophorae* on the seaward fringes of large, dense and well established stands of mature specimens. Suitable discrete patches of apparently favoured vegetation could yield dozens of adults and nymphs in an area roughly 1-1.5 m^2. *Acacia longifolia* subsp. *sophorae* is a new food plant record for *M. profana*.

DISCUSSION

As previously stated, *M. profana* has not previously been documented as occurring in the wild in Tasmania. The Department of Primary Industries, Parks, Water & Environment (DPIPWE) Tasmanian Plant Pest Data Base has three records for *M. profana*. Two relate to mainland specimens while the only one of direct relevance is based on a specimen intercepted on banana fruit at Whitemark, Flinders Island in July 1962 (L. Hill pers. comm.). What makes the Beechford population even more intriguing is that the author collected extensively at these same sites in the 1970s and 80s and never encountered this species. *Mictis profana* is a large and conspicuous insect and is unlikely to have gone unnoticed for many decades if it occurred naturally in any significant numbers in coastal Tasmania. The conspicuousness of this insect is further supported by its extensive, Australia-wide distribution evident in on the species page on the ALA website. The question then arises whether *M. profana* has always occurred on the northeast coast of Tasmania and has up until now been overlooked, or whether this population represents a relatively recent incursion into Tasmania. For the reasons outlined above, the author favours the latter explanation. Beechford is one of numerous popular camping sites for both local and interstate tourists during the summer months along the northeast coast between Georgetown and Tomahawk so it is not inconceivable that eggs, nymphs or adults of *M. profana* arrived at the site in or on a vehicle originating from mainland Australia. It has been suggested, based on the wide distribution of *M. profana* on mainland Australia, that adults are possibly highly dispersive (L. Hill pers. comm.). During field work at Beechford, adult *M. profana* were observed on several occasions flying strongly over the dune scrubland at heights of up to 6 m and the author suggests that a small founder population could spread rapidly in succeeding years since kilometres of suitable, interconnected habitat occur along the northeastern coastline both east and west.

The apparent preference of *M. profana* for softer, juvenile foliage on young specimens of *Acacia longifolia* subsp. *sophorae* may be typical for the Coreidae in general. Research in Tasmania found that nymphs of the gum tree bug *Amorbus obscuricornis* favoured the superior foliar quality of new shoots on coppiced *Eucalyptus* as the vegetation was softer, had higher moisture content and a lower carbon/nitrogen ratio (Steinbauer et al. 1998). Near-coastal scrubland in Tasmania is possibly a challenging environment for sap-feeding insects such as *M. profana* due to high winds which tend to desiccate exposed new foliage and typically 'wind prune' trees and shrubs into a characteristic shape with new growth occurring primarily on the lee side of prevailing winds. All the dense aggregations of *M. profana* at Beechford that included nymphs were confined to sheltered gullies in dune scrubland or on very low-growing *Acacia longifolia* subsp. *sophorae* no more than 40 cm in height in more exposed sites.

The author encourages all interested and suitably motivated Tasmanians to document the occurrence of *M. profana* and collect voucher specimens with accurate locality data to be lodged at recognised institutions such as

the Queen Victoria Museum & Art Gallery (QVMAG) and Tasmanian Museum & Art Gallery (TMAG). If the Beechford population of *M. profana* does represent a relatively recent incursion, it would be expected that colonisation of northeast and east coast dune scrubland habitats will proceed at a rapid pace. The mouth of the Tamar Estuary to the west of the Beechford site may act as somewhat of a barrier to rapid colonisation of coastal habitats in that direction.

ACKNOWLEDGEMENTS

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Plate 2. A second or third instar nymph of *Mictis profana* on *Acacia longifolia* subsp. *sophorae* (large numbers of nymphs were observed in the areas surveyed in Figure 1)

THE FIRST RECORD OF THE ST. ANDREW'S CROSS SPIDER (ARANEIDAE *ARGIOPE KEYSERLINGI*) IN TASMANIA

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Non-endemic species can cause issues when they appear in new places, such as the redback spider (Theridiidae *Latrodectus hasselti*) in Japan (ABC News 2014), or the fire ant (*Solenopsis invicta*) in Queensland (Department of Agriculture and Fisheries 2015). Biosecurity measures are in place to minimise the likelihood of the introduction of non-native species entering Tasmania, so as to protect the State's environment, agriculture and economy. However, non-endemic species do enter Tasmania from time to time and become established. This paper reports the arrival of a mainland spider species in Tasmania.

The large orb-web weaving spider known as the St. Andrew's Cross spider (Araneidae *Argiope keyserlingi*, Karseh 1878; Plates 1-3) is endemic to Queensland, New South Wales and Lord Howe Island (World Spider Catalog 2016). However, the Atlas of Living Australia also shows occurrences of the spider around the city of Melbourne (bie.ala.org.au/species/Argiope+keyserlingi)

The female of the species grows to 13 mm body length and is characterised by a horizontally striped abdomen and its large orb-web with a zigzag silk cross at the centre, on which the spider sits day and night (Plate 2). The male grows to 5 mm and lacks the distinguishing stripes of the female (http://www.arachne.org.au).

The St. Andrew's Cross spider was first recorded in Tasmania in January 2014 when one specimen was found in the Launceston suburb of Riverside (QVM.2015.13.25). Since then, another five specimens have been recorded at four sites in northern Tasmania:

- two females in a residential garden at Bridport in Jan. 2015 (QVM.2015.13.26);
- one female at Archers Knob, within the Narawntapu National Park, Bakers Beach;
- one female at Port Sorell; and
- one female at St Helens.

Photographic records have been supplied to the author. No males have been reported.

The Bridport specimens found in January had both produced viable egg sacs, indicating either the presence of males in Tasmania during the mating season (spring), or that these gravid females had arrived recently from the mainland. The remaining female spiders reported did not have egg sacs present.

There are two questions to be answered; firstly, how did these spiders reach Tasmania, and secondly, rhetorically, how many are present in bushland where they have not been observed.

There are two potential vectors for this species arrival in Tasmania; 'ballooning', or via vehicles and freight transported from mainland Australia.

Ballooning is the phenomenon of spiders producing long strands of major ampullate silk and being lifted by the wind. Brunetta & Craig (2010) write that "with a single puff above them, off the spiderlings glide, sometimes drifting only a few feet but sometimes whisked up into air currents that carry them hundreds of kilometres". Actual figures for the distance travelled are unsubstantiated except for the description

given by Charles Darwin on 1 November, 1832 off the mouth of the Plate River, Argentina, when "The ship was sixty miles distant from the land, in the direction of a steady though light breeze. Vast numbers of a small spider, about one-tenth of an inch in length, and of a dusky red colour, were attached to the webs".

Ballooning is a known dispersal mechanism for this family of orb-web weaving spiders (Australian Museum 2015), though not recorded for this species. This vector would indicate that it is possible for spiderlings to be blown across Bass Strait by northerly winds.

The alternative likely vector is road transport. In the year from July 2014 to June 2015, Tasmania received a total of 177,912 vehicles and 226,828 twenty-foot equivalent units of containers (Department of State Growth). These pose biosecurity risks to Tasmania's environment and economy. Despite biosecurity measures being undertaken at entry points to Tasmania, incursions do occur, for example, the introduction of the bumble bee (*Bombus terrestris*) into Tasmania in February, 1992 (Hingston, et al. 2002). Spiders or egg sacs could arrive unseen on containers or attached to the underside of road vehicles and hatch here in the state, allowing potentially large numbers of juveniles to grow and reproduce in the state.

Regardless of the vector, the St. Andrew's Cross spider is now present in Tasmania and the question is, can it become established.

Population growth will rely on enough individuals of both sexes residing in close proximity to each other, and in an environment that supports survival; this would include suitable habitat, food and climate, particularly temperature.

The establishment of St. Andrew's Cross spider colonies requires sufficient numbers to survive through to maturity in the Tasmanian environment. As temperatures rise in response to climate change, it is likely that survival rates will increase.

To determine if there have been other recorded sightings of the St. Andrew's Cross spider in the state, I have contacted Dr Simon Grove, Senior Curator, Invertebrate Zoology, Collections and Research Facility, Tasmanian Museum and Art Gallery, and Guy Westmore, Lionel Hill and Jamie Davies of the Department of Primary Industries, Parks, Water and Environment. None of these people have recorded the presence of the spider in Tasmania. However, I have had unconfirmed reports of the St. Andrew's Cross spider occurring in the state. These sightings may have been confused with a similar spider *Argiope trifasciata*, (Forsskål 1775; Plate 4) that is native to the state.

To obtain a comprehensive knowledge of the presence of the St. Andrew's Cross spider in Tasmania, I am requesting that any observations of the spider be recorded and forwarded to me at my email address or through the Queen Victoria Museum and Art Gallery in Launceston. Photographs of the spider sighted would also be welcome together with GPS co-ordinates of their location and if any egg sacs are found on or near the web.

ACKNOWLEDGEMENTS

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Plate 1. Female on centre of web (spider collected at Bridport)

Plate 3. Ventral surface of female showing distinctive pattern on abdomen (spider collected at Bridport)

Plate 2. Showing white cross of zig-zagged silk (spider collected at Bridport)

Plate 4. *Araneidae Argiope trifasciata* (image: David Tng, Hobart)

OBSERVATIONS OF *CASTIARINA INSCULPTA* (MIENA JEWEL BEETLE) IN 2016

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Over the past four years, the authors have elosely monitored the timing and flowering-density of *Ozothamnus hookeri* (sealy everlastingbush), the reeognised food plant of *Castiarina insculpta* to determine if it is indieative of seasonal beetle numbers. Aetivity of the beetle has been found to eoineide with the flowering of the shrub whieh is also the food plant for the beetle larvae. Sinee multiple living speeimens of *C. insculpta* were deteeted in February 2013 (Bonham et al. 2013), *O. hookeri* on the Central Plateau has been observed to eommenee flowering late in January with peak flowering oeeurring in early to mid-February. *Castiarina insculpta* has been reeorded throughout February, with greatest numbers appearing early and dwindling towards the end of the month. In 2016 we reeorded an interesting variation as *O. hookeri* began flowering in the first week of January with the majority of shrubs seeding by early February; this may have been attributable to the warmer and very dry eonditions leading into summer. Aetivity patterns of *C. insculpta* have thus far been observed to fluetuate between seasons, numbers being high in 2013, extremely low in 2014 (Speneer & Riehards 2014), elevated numbers again in 2015 (Riehards and Speneer unpublished data) and in the eurrent year numbers were mueh redueed and oeeurring earlier than previously doeumented.

We alerted interested field naturalists to the early blossoming of *O. hookeri* and the appearanee of *C. insculpta*, resulting in field naturalists undertaking a trip to the area on 24 January; where they reeorded a single, presumed *C. insculpta* in flight at Liawenee.

The authors visited the Central Highlands three times during January-February 2016, reeording *C. insculpta* presenee at Tods Corner, Liawenee, Lake Augusta, Lake Ada, Carter Lakes and a site on Lake Augusta Road adjaeent to Liawenee Canal. Beetles were mostly observed as isolated individuals; however, two pairs in eopula were reeorded at separate sites. The earliest sighting for the season was 10 January and the final observation oeeurred on 5 Febmary.

Our most interesting reeord for the season oeeurred at Carter Lakes on 5 February, when we ehaneed upon a female *C. insculpta* feeding on *Baeckea gunniana* (alpine heathmyrtle) blossom (Plate 1). Flowering *O. hookeri* were available within 40 m of this sighting, but no *C. insculpta* were in attendanee. *Baeckea gunniana* is widespread in the Central Plateau but oeeurs infrequently in the area surveyed. This reeord eonstitutes a new food plant for adult *C. insculpta*, and only the seeond known food source utilised by the speeies, despite extensive searehing in previous seasons by the authors of all flowering shrubs oeeurring at sites where *C. insculpta* has been reeorded. Observations like this are exeellent reminders that we must never ceasc our vigilant searehing even when we assume we have identified the requirements of a species.

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Plate 1. Female *Castiarina insculpta* feeding on *Baeckea gunniana* blossom

TASMANIA'S FORGOTTEN JEWEL: DISTRIBUTION AND ECOLOGICAL NOTES ON THE JEWEL BEETLE *CASTIARINA BREMEI* HOPE 1845 (BUPRESTIDAE: BUPTRESTINAE)

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INTRODUCTION

Castiarina bremei is a medium-sized orange-red and blue-black aposematically coloured jewel beetle (Plate 1) ranging from 15-20 mm in length. It has been previously recorded in Queensland, New South Wales, Victoria, South Australia and Tasmania (Barker 2006). For reasons that are unclear, this species was omitted from the book *Jewel Beetles of Tasmania* (Cowie 2001) and it appears to be poorly known in the state and not previously represented in the collections of either the Queen Victoria Museum & Art Gallery (QVMAG) (authors obs.) or the Tasmanian Museum & Art Gallery (TMAG) (S. Grove pers. comm.).

The Atlas of Living Australia (ALA) records Tasmanian specimens represented in mainland collections however. Museum Victoria Entomology Collection holds a single specimen (COL77426) collected on Flinders Island (Plate 2), Australian Museum Entomology Collection holds a single specimen (Entomology.K.95964) collected from Launceston (Plate 3) and the South Australian Museum Terrestrial Invertebrate Collection holds two specimens (Entomology 25-017467 and 25-017468) collected in the "central highlands" (Plate 4). The labels for all these specimens contain little ecological information, precise locality data or even dates of capture (Plates 2-4).

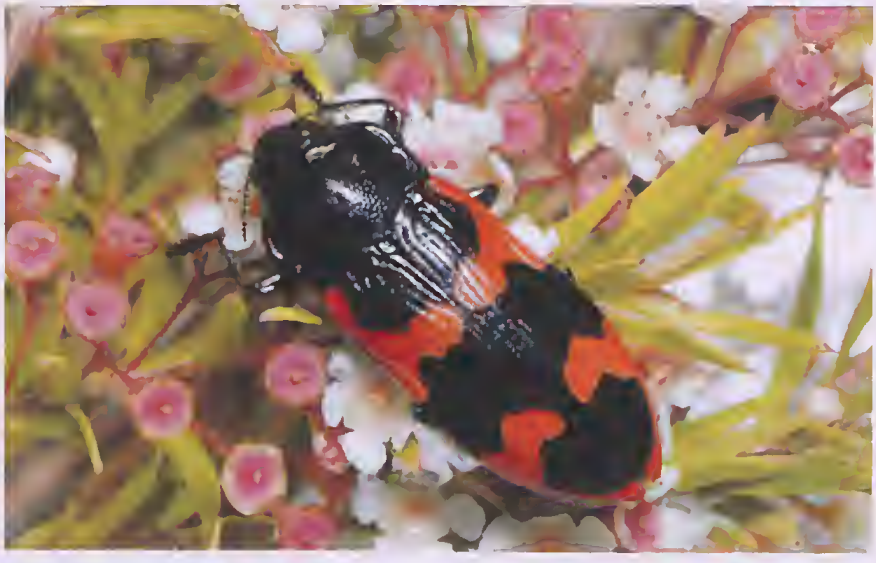

Plate 1. *Castiarina bremei* feeding on flowers of *Baeckea virgata* at Riverside, Launceston (image: D. Maynard)

RECENTLY COLLECTED TASMANIAN SPECIMENS

Since 2013, QVMAG has accumulated an additional 21 specimens of *C. bremei* from the Tamar Valley in northern Tasmania. Fifteen specimens were collected in the author's suburban garden in Riverside, Launceston (QVM.2015.12.1504-1518), 5 were collected at Legana, north of Launceston (QVM.2015.12.1519-1523) and one from Georgetown, at the mouth of the Tamar (QVM.2015.12.1524). All these records are from the Tamar Valley and represent clear collecting bias as the majority of the author's regular collecting sites are in this region. In addition, C. Spencer and K. Richards supplied the author with a photo of a *Castiarina* specimen in their personal collection from New England Road, Blue Tier, northeast Tasmania in February 2007 that conforms to *C. bremei* (Plate 5). It is anticipated that collecting effort in suitable habitat at the right time of year (late January-early February) will document this species in other locations.

Plate 2. Flinders Island *C. bremei* held in the Museum Victoria Entomology Collection (image: D. Maynard)

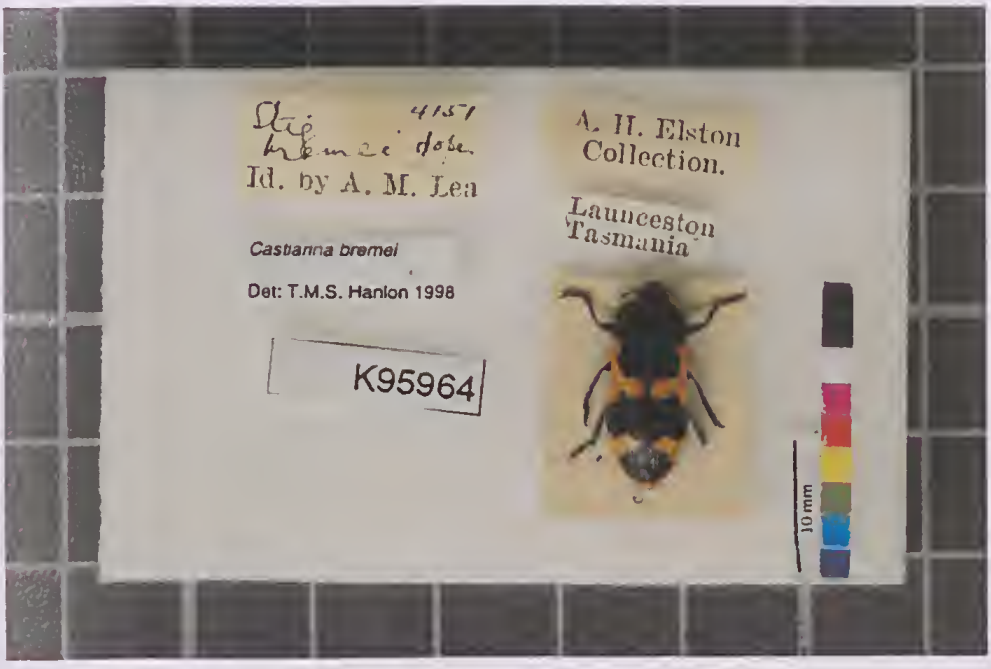

Plate 3. Launceston *C. bremei* held in the Australian Museum Entomology Collection (image: Australian Museum)

ECOLOGICAL OBSERVATIONS

All 21 specimens in the QVMAG collection were taken on introduced *Baeckea virgata** (13) and *Leptospermum petersonii* (8) (Myrtaceae) growing in residential properties. *Castiarina bremei* appears to have a relatively short and synchronous adult activity period from mid-January to mid-February at the hottest time of the year in the Tamar Valley. No specimens have been observed or collected outside of this period. Mating has not been observed, even though the author has never collected more than half of the specimens in any one season to ensure enough remain for ecological observations from the Riverside residence. Specimens have been observed to aggressively defend individual patches of blossom from other conspecifics**, actively attacking them with mandibles and driving them off the flowers. The sex of these fighting individuals was not determined. Males may fight if females are attracted to particularly nectar rich clusters of inflorescence and females may fight if defending such a food source for nourishing their ova.

Of interest is an apparent biannual occurrence, at least in the author's property at Riverside, Launceston. *Castiarina bremei* was common in 2013, absent in 2014 and common again in 2015. Favoured food trees were in flower at the same time of year across all three summers. These observations are very similar to those of Bonham et al. (2013) and Spencer and Richards (2014) for annual variations in abundance of the Miena jewel beetle *C. insculpta*. These wide variations in abundance are well documented for *Castiarina* but are poorly understood. In drier regions of Australia, emergence appears to be tightly linked to the flowering of host plants which is often intermittent (Barker 2006). *Castiarina* larvae are thought to develop slowly under some circumstances; further, adults are capable of remaining in pupal chambers for very long periods before emergence. There are records of some Western Australian *Castiarina* taking 5-10 years to emerge from collected boles and roots of mallee eucalypts (Carnaby 1987).

ACKNOWLEDGEMENTS

Thanks to Andreas Urban for recognising *C. bremei* specimens amongst a bulging store box of unsorted insect specimens. Special thanks to the various museum curators; David Maynard at QVMAG, Simon Grove at TMAG, Peter Hudson at the South Australian Museum, David Britton formerly of the Australian Museum and Simon Hinkley at the Museum of Victoria for locating specimens and then loaning or photographing them for inclusion in this paper. Thanks also to Chris Spencer and Karen Richards for alerting the author to the specimen in their collection.

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AUTHOR'S NOTES

* *Baeckea virgata* has undergone various name changes and is now placed in the genus *Sannantha*, the various species spread around Australia and New Caledonia, and the species commonly sold in nurseries as *B. virgata* is uncertain (M. Wapstra, pers. comm.).

**In two previous works (Fearn 2013 and Fearn & Maynard 2013) ecological notes were provided on *C. bremei* but under the incorrect name of *Castiarina insularis*.

Plate 4. One of two *C. bremei* from Tasmania's central highlands held in the South Australian Museum Terrestrial Invertebrate collection: labels on both specimens state "Tasmania A. Simson 3525" (image: South Australian Museum)

Plate 5. *Castiarina bremei* from Blue Tier, northeast Tasmania (image: K. Richards)

TWO BLUES FOR TAROONA

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This summer and autumn (2016), I spotted two species of blue butterfly in Taroona whose local presence surprised me, so I thought it worth recording the sightings here.

The first species is *Lampides boeticus*, the long-tailed blue, also known as the pea blue. This is a very widespread species across the mainland of Australia, as well as in large parts of Asia, Africa and southern Europe. In core parts of its range it is continuously brooded, but because it lacks a hibernation strategy it is cold-intolerant and this precludes its permanent occupation of areas with cool winters, such as Tasmania. Nevertheless, towards the cooler fringes of its range it appears regularly as a summer migrant, breeding up through the summer months but then dying off in the winter.

In Tasmania, it appears sporadically, often on the back of strong northerly airflows that aid its southwards dispersal from the mainland. It is possible that it has established a toe-hold as a resident along the north coast, but further south it remains a sporadic visitor. This year, it seems that the northerly winds that blew for a few days in early October brought substantial numbers of long-tailed blues across Bass Strait, meaning that the species was able to make an early start to breeding locally. The females lay their eggs on the flowers and seed-pods of a range of plants in the Fabaceae, including garden beans.

The first adults that I saw in Taroona were flying around Devon Walk and Taroona Crescent, including traversing our garden. They tend to fly at a greater height than other blue species, typically at about head-height; and they are on the whole larger and more prominently blue than other local species. On 7 February one eventually settled in our garden, enabling me to confirm identification. Having got my eye in, I noticed them on several further occasions over the following weeks. My best sighting came right at the end of the season, on 24 April, when I watched a female ovipositing among the flower-buds of broad bean plants in the Taroona Neighbourhood Garden (Plates 1 & 2). The plants were pulled up the next day, putting an end to the chances of further home-grown blues. However, at that time of year, any resultant larvae would have had little chance of completing their development before the weather became too cold for them.

Plates 1 & 2. Female long-tailed blue, ovipositing and then resting on broad bean plant in the Taroona Neighbourhood Garden, 24 April 2016

The second species of note is *Theclinesthes serpentata* subsp. *lavara*, the saltbush or chequered blue. The species as a whole is widespread on the mainland of Australia, but the subspecies *lavara* is endemic to Tasmania and considered rare under the *Threatened Species Protection Act 1995*. Larvae feed on the developing berries of coastal saltbush *Chenopodium candolleanum*, and also probably on the flowers and seeds of related salt-tolerant plants in the genus *Atriplex*. On 2 March I watched a female of this species fluttering around a coastal saltbush at Crayfish Point, seawards of the Taroona foreshore track below the Institute of Marine and Antarctic Studies laboratory. She eventually began ovipositing among the plant's flowers and berries, before resting nearby (Figures 3-4). On 8 April, I watched two or perhaps three saltbush blues fluttering around the saltbushes and *Atriplex* in this same area. These food-plants occupy only a short stretch of the foreshore on Crayfish Point, but also occur elsewhere along the Taroona foreshore, including behind Dixons Beach; nevertheless, if this is the entire extent of the species' occupancy in the Derwent (as the records – or lack of them – would suggest), then one would have to consider its local status as precarious compared to some of the larger colonies further east such as at Marion Bay.

Plate 3. Female saltbush blue, ovipositing and then resting on coastal saltbush at Crayfish Point, Taroona, 2 March 2016

BASKING OR INCUBATION? UNUSUAL BEHAVIOUR FOR THE WOLF SPIDER *TASMANICOSA GODEFFROYI* KOCH 1865 (ARANEOMORPHAE: LYCOSIDAE)

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The large wolf spider *Tasmanicosa godeffroyi* (= *Lycosa tasmanica* in older literature) is common and widespread in Tasmania from sea level to < 900 m (S. Fearn unpubl. data).

This spider constructs an open, silk lined burrow often beside a rock or grass clump in sunny exposed situations. It is common in urban habitats and often generates excitement from householders who invariably confuse it with the more widely known and feared funnel web spider, *Hadronyche venenata* (Douglas 2013; S. Fearn pers. obs.). *Tasmanicosa godeffroyi* is uniformly greyish to dark brown dorsally with a disruptive camouflage pattern of lighter streaks and banding (Plate 1). The underside of the abdomen in contrast is jet black (Plate 2).

In November 2014 an adult female with a large egg case was observed for several consecutive days apparently thermo-regulating by reversing out of its burrow on sunny mornings and exposing the black underside of its abdomen as well as its egg case to direct sunlight (Plate 2). These observations took place in the author's garden at Riverside, Launceston. In Plate 2 it can be observed that the spider's egg case is in contact with the portion of abdomen exposed to the sun. This behaviour clearly appeared to be thermoregulatory in nature and given that the egg case was also exposed to sunlight it may represent an example of temperature regulation to assist embryonic development of individual eggs within the egg case. Such an egg case may contain several hundred eggs (S. Fearn unpubl. data) and thus represents a considerable reproductive investment by the female. The distinctive black underside of the abdomen in this species may have evolved in Tasmania's cool and variable climate for efficient thermoregulation through basking and more specifically may be important incubation behaviour to assist egg development in large egg cases with a relatively high surface to volume ratio.

The author suggests that such behaviour warrants further research, perhaps under laboratory conditions, to determine the true nature and frequency of this behaviour.

ACKNOWLEDGEMENTS

Many thanks to John Douglas for his photo of *T. godeffroyi* as well as many fruitful spider discussions. Thanks also to David Maynard for reviewing the manuscript.

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Plate 1. A typical adult female *Tasmanicosa godeffroyi* (image: J. Douglas)

Plate 2. *Tasmanicosa godeffroyi* exposing the black ventral surface of its abdomen to the sun while in contact with its large, round egg case (image: S. Fearn)

NEW HOST PLANT RECORD FOR THE BEETLE *EURISPA VITTATA* BALY 1858 (CHRYSOMELIDAE: CASSIDINAE) IN NORTHERN TASMANIA

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INTRODUCTION

Eurispa vittata is an elongate, somewhat flattened beetle, ranging in length from 9 to 13 mm. The elytra are densely and regularly punctate, and feature longitudinal brown stripes which terminate in a distinctive elongate sharp spine and a short sub-apical sharp tooth, both of which are more pronounced in the male (Hawkeswood & Takizawa 1997; Plates 1 & 2). This body shape, representative of Cassidinae, is believed to be an adaptation to feed on the mesophyll layers of the leaves of pandanus, grasses and sedges, as well as the leaf bases and developing leaflets of various palms (Lawrence & Slipinski 2013). *Eurispa vittata* is recorded from Western Australia, New South Wales, Victoria and Tasmania (http://ala.org.au/species/Eurispa+vittata October 2015).

Eurispa vittata is reportedly common and widespread in Tasmania and is always associated with native sedge in the *Gahnia* genus (Cyperaceae: Monocotyledonae; S. Grove 2015, pers. comm.). However, until recently the *Atlas of Living Australia* (ALA, viewed 19 Oct. 2015, bie.ala.org.au/search?q=eurispa+vittata) recorded only two registered Tasmanian specimens, held in the Museum of Victoria Entomology Collection (COL45545 and COL45546) and collected at Mount Nelson, Hobart in 1933. The Queen Victoria Museum and Art Gallery (QVMAG) holds 22 specimens (QVM.2015.12.1525-1546) collected in association with this paper, while the Tasmanian Museum and Art Gallery (TMAG) holds a further 35 specimens recently acquired from the former Forestry Tasmania Entomological Collection; S. Grove 2015, pers. comm.). The only previous study of this species is from north-eastern NSW and reported that adult and larval *E. vittata* were apparently monophagous on the native red-fruit saw-sedge, *Gahnia sieberiana* (Hawkeswood & Takizawa 1997). In this work we record a previously undocumented food plant in northern Tasmania, cutting grass or the brickmaker's sedge, *Gahnia grandis*.

FIELD OBSERVATIONS

On 19 September 2015 the authors visited an abandoned roadside quarry on the Brushy Lagoon road (C714; GDA 94: 0480684E 5418766N, elevation 260 m). The quarry was littered with waste timber, from historical forestry activity, and rocks. Regrowth included small saplings of *Eucalyptus*, *Acacia* and *Banksia*, along with clumps of *Gahnia grandis* (Plate 3). Nearly every clump of *G. grandis* at this location contained mating pairs of *E. vittata*. A total of 22 specimens were collected and accessioned into the invertebrate collection of QVMAG.

Hawkeswood & Takizawa (1997) suggested that *E. vittata* was monophagous in all life history stages on *G. sieberiana* based on their observations in coastal NSW. However, it was unlikely that such an assertion would prove to be correct as *E. vittata* occurs in Western Australia but *G. sieberiana* does not. Our field studies have now established

G. grandis as an additional food plant and further research is required to identify if other species of *Gahnia* are also hosts to *E. vittata* aeross its known range.

Plate 1. Mating pair of *Eurispa vittata* on *Gahnia grandis* near Brushy Lagoon, northern Tasmania: note the distinctive body form and colouring (image: D. Maynard)

ACKNOWLEDGEMENTS

Thanks to Mark Wapstra for identifying the host plant and providing distribution data. Thanks also to Simon Grove (TMAG) for providing data on specimens held in that institution.

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Plate 2. Sexual aggregation of *Eurispa vittata* on *Gahnia grandis* near Brushy Lagoon, northern Tasmania: note the distinctive apieal spines on the tips of elytra of the top male (image: D. Maynard)

Plate 3. A specimen of *Gahnia grandis* at the collection site (image: D. Maynard)

THE LESS YOU WALK, THE MORE YOU SEE?

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In December last year I suffered a relapse of leukaemia. For six months my world shrunk dramatically, first when I was confined to a hospital ward and then as I recuperated at home in Taroona while awaiting the next phase of treatment in Melbourne (from where I am writing this). As my body got stronger between rounds of chemotherapy, I ventured out on daily walks along the Taroona foreshore. My route always took in the steps and cliff-top walk at the southern end of Hinsby Beach. At the top of the steps is a bench, a memorial to one KB. From February to June 2016, every day I would sit on this bench while I recovered my breath. It became a place of quiet contemplation, and provided me with an opportunity to watch for insects and other small creatures going about their lives in the adjacent cliff-top woodland.

I was amazed at the range of animal life that I saw, either as I sat on this bench, or as I puffed my way up the steps, or as I walked slowly along the short section of cliff-top track beyond the bench. It seemed to me as though there might be a law of nature at work here, whereby the less ground you cover in a walk, the more nature you encounter – at least amongst the smaller species. For what it's worth, I detail some of my observations here; I have collated photographs of all the species I mention into an on-line album on Flickr with the same title as this article:

https://www.flickr.com/photos/simongrovetmag/albums/72157673280641181.

Note that none of my observations involved any grubbing around in the leaf-litter – a usually productive technique, but denied me because of my fragile medical condition.

The most surprising find was the number and diversity of velvet-ants (Mutillidae). The flightless, ant-like females are what people normally – albeit only occasionally – spot, often on sandy paths as the animals search for the nesting burrows of solitary bees or wasps: their larvae are ectoparasites on the bee or wasp larvae. From my commanding position on the bench I spotted females of three species on the adjacent path. First came *Ephutomorpha blanda*, a species that I rarely see anywhere. Then came *E. dorsigera*, a more frequently observed species. Then later in the season it was the turn of *E. lateralis*. Once I got my eye in, I noticed that there was a constant traffic of male *E. lateralis* flying low over the leaf-litter, often several visible at the same time. The males were on a frantic and non-stop search for females. Only on one occasion did I witness an encounter between males and a female (Plate 1): she was pursued by several males who often smothered her to form a 'mating ball' with the apparently uninterested female in the middle; she eventually shook off her suitors and disappeared into the leaf-litter. Towards the end of March the movements of the males became slower and they spent more time crawling than flying, presumably as their energy reserves dwindled; eventually the day came when there were none to be seen.

True ants (Formicidae) also abounded. Most conspicuous were jackjumper *Myrmecia pilosula* – nesting right next to the cliff-top track – and the larger bull-ant *M. forficata*. *Camponotus consobrinus* and *Rhytidoponera victoriae* (the latter identified by Lynne Forster) seemed to co-exist in the same patch of ground as the jackjumpers, but perhaps avoided peak jackjumper activity by tending to emerge later in the day. The slender-bodied black-and-yellow potter-wasp *Deuterodiscoelius verreauxi* (Vespidae) was a surprise find one day in February,

scouting for prey among foliage of shrubs growing alongside the steps. I also spotted the yellow-marked solitary bee *Hylaeus perplexus* (Hylaeidae) here on one occasion. Two species of spider-hunting wasp (Pompilidae) put in an appearance: a species of *Sphictostethus* – a common sight in bushland, with characteristic orange and black banding on its wings – and the larger and rarer *Calopompilus* species, probably *C. raptor*, a very striking species with its dark-fringed orange patches on its wings. The equally striking parasitoid wasp *Callobracon capitator* (Braconidae), with red head and black and white body, was a more frequent sight, especially along the handrails to the steps.

Plate 1. Velvet-ant *Ephutomorpha lateralis*, two males, one attempting to mate with female

As for beetles, I was surprised to spot two species of stag-beetles (Lucanidae). On separate occasions I watched from the bench as a male and a female of the flightless *Lissotes cancroides* ambled across the track; while on another occasion I found a male of the flighted *Syndesus cornutus* that had been caught in a spider's web on the handrail to the steps. Also on the handrail one day was a native 'woodworm' beetle, *Hadrobregmus areolicollis* (Anobiidae); on another day the larva of the ladybird *Rodolia cardinalis* (Coccinellidae); on another the soldier-beetle *Chauliognathus tricolor* (Cantharidae); and on another day the eucalypt-feeding leaf-beetle *Paropsisterna subcostata* (Chrysomelidae). Two species of longhorn beetle (Cerambycidae) also put in an appearance along the cliff-top track: *Disterna canosa* (Plate 2) and *Phacodes personatus*.

One warm, sunny day I spotted a male feather-horned beetle *Rhipicera femorata* (Rhipiceridae) flying high over the trackside she-oaks, but it didn't descend low enough to be photographed. On the steps one day I spotted the case-bearing larva of the leaf-beetle *Cadmus australis* (Chrysomelidae). I wouldn't have noticed it had it not been for the unidentified

parasitoid wasp (Braconidae) that was unsuccessfully trying to sink its ovipositor into the well-protected larva - demonstrating the benefits for this unusual leaf-litter-feeding beetle larva of living life encased in a tube of its own faeces! The most commonly observed beetle was the honey-brown beetle *Ecnolagria rufescens* (Tenebrionidae).

Plate 2. Longhorn beetle *Disterna canosa*

Perhaps the most striking of all insects along the cliff-top track was the jewel-bug *Choerocoris paganus* (Scutelleridae). A 'creche' of nymphs of various instars, and adults too, was in operation at one particular point along the track throughout most of the late summer and autumn. When the weather was warm, the bugs would be dispersed amongst the low vegetation, but when it cooled down they could be reliably located all huddled together, generally on an overturned dried eucalypt leaf or a dark-coloured piece of dead wood that presumably provided them with a little extra warmth. The only other bug that I identified nearby was the stink-bug *Platycoris rugosus* (Pentatomidae), observed from the bench one day as it crossed the track.

The bench-side observation that I cherish above all others was of a butterfly: a beautiful, delicate silver xenica *Oreixenica lathoniella* (Nymphalidae) (Plate 3) that made a brief appearance, settling momentarily among some tussock grass growing along the top of the cliff-line. Witnessed also by Lynne Forster who was sharing my short walk, this remains my only sighting of this species in Taroona.

I often disturbed moths along the track; those that I can put a name to (thanks to Cathy Byrne) were all either the tree-lucerne moth *Uresiphita ornithopteralis* (Crambidae) or an *Endotricha* species (Pyralidae). Late in the season, clumps of tiny eggs appeared on the underside of

overhanging eucalypt foliage: these belonged to gum-leaf skeletoniser *Uraba lugens* (Noctuidae) (Plate 4). Over a period of about a week I spotted the larva of a case-moth (Psychidae), as it meandered ponderously along the hand-rail to the steps.

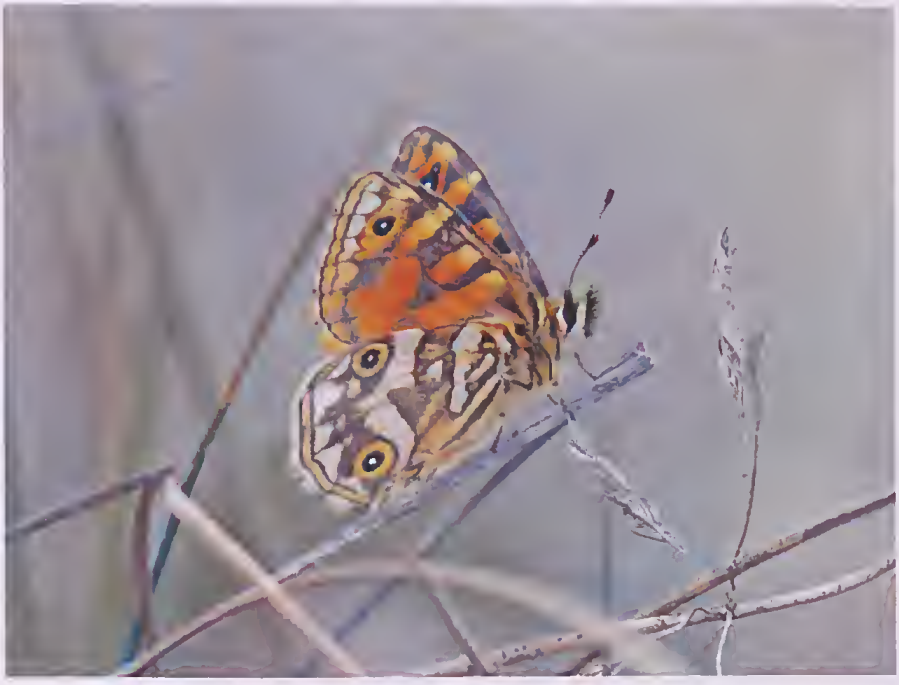


Plate 3. Silver xenica *Oreixenica lathoniella*

Finally to spiders. I often saw red-and-black spiders *Ambicodamus* species (Nicodamidae) along the track. More remarkable was a female of the tiny jumping-spider *Tara* species (Saltiicidae), on the hand-rail to the steps. What these spiders lack in size they make up for both in personality and in the unusual metallic blue and purple markings on the forelegs.

While this short section of my walk proved rich in insects, it was probably just too short to clock up many observations of birds or reptiles. Nevertheless, I was occasionally rewarded with close views of golden whistler *Pachycephala pectoralis* and grey fantail *Rhipidura albiscapa*, and on one occasion I flushed a beautiful firetail finch *Stagonopleura bella* from the herbaceous vegetation at the foot of the steps. A collared sparrowhawk *Accipiter cirrocphalus* scowled defiantly at me from the track one day, having just brought down a honeyeater of some sort. A white's skink *Liopholis whitii* could often be seen sunning itself on an unvegetated part of the cliff-top path, but it always retreated to the safety of its burrow on my approach, from where it would peep out at me.

So was this short section of walk a biodiversity hotspot? I suspect not – pleasant though the surrounding coastal woodland is here. I suspect it's just that sitting or walking slowly as I did, and repeating the walk dozens of times, is the secret to getting glimpses into the lives of these little creatures. While I can't recommend leukaemia as a means of slowing down, I do recommend the slowing-down part if you really want to see what's abuzz in your local patch.

Plate 4. Eggs of gum-leaf skeletoniser *Uraba lugens*

ACKNOWLEDGEMENT

Many of the identifications were made with the help of Kristi Ellingsen and Tony Daly's *Insects of Tasmania* website (https://sites.google.com/site/inseetsoftasmania/home) or through comments reeeived through the Tasmanian Inseets and Spiders Faeebook group.

THIRTY-SIX HOURS WITH ARJAN

Els Wakefield

elswakefieldtas@gmail.com

Just before Christmas of 2015 Noah Stryker, a young birder from Oregon, USA, visited Tasmania for less than two days in an attempt to see or hear as many of our birds as possible towards the end of his "World Big Year". A small group of us managed to help him find all the endemics and more and we were thrilled to hear soon after that he broke the world record for the number of birds experienced in one year. We all felt proud that we had helped him achieve his goal and so it was with mixed feelings that we became aware that another birder was attempting to beat that record.

This birder, Arjan Dwarshuis, is from the Netherlands and had only 36 hours to spend in Tasmania on 23rd to 24th March 2016, just before Easter. After some discussion, and being able to speak Dutch, I offered to help him on my own in order to remain as flexible as possible.

While shopping before his arrival, I wondered what a young Dutch man away from home would appreciate. I selected some Dutch treats such as almond cakes, stroopwafels, king peppermints, and salted liquorice as well as fresh coffee and sourdough bread.

Having vacuumed the house and made the spare bed, I raced out of the door, filled the car with petrol, dropped by Jackman and McRoss on impulse for half a dozen of those fantastic Easter buns and headed for the airport to meet the plane by 12:30 pm. Little did I realise how much of a lifesaver these buns would be!

While waiting for the passengers to walk off the plane, a shared smile began a conversation with a fellow Dutch woman who works on the booth of the Bruny Island ferry. I briefly told her my plans and she told me not even to think about trying to catch that ferry.

As Arjan walked off the plane, we recognised each other immediately and not just because we were both wearing binoculars (his are Swarovski as they were sponsoring him for his World Big Year), not because he was wearing a cap saying Dutch Birding, not because he sported a big beard. We just knew! Driving from the airport, Arjan spotted his first Forest Raven and some Native Hens. For Arjan, actually seeing the birds for the first time was vital as he could then add them to his list. We saw many that he had seen before but only the new birds are mentioned here.

Our first stop was Cemetery Point, Sorell. Through his Swarovski telescope he saw Pacific and kelp gulls, musk duck, black-faced cormorants, chestnut teal and sooty oystercatchers for the first time. He also spotted the musk lorikeets on our way to the bakery for a quick lunch.

Then we drove straight to Orford, spotting yellow-tailed black cockatoos and dusky woodswallows along the way. Parking at the mouth of the Prosser River, we watched a scarlet robin, crescent honeyeaters, a yellow-throated honeyeater, black-headed honeyeaters. We heard black currawongs calling up-stream. Arjan was hoping to see the fairy tern chicks if they were still there. He didn't but he did catch the two groups of hooded plover, one of his favourite birds.

From Orford we drove via Buckland, through Bream Creek to Eaglehawk Neck hoping to see some striated fieldwren, which we missed but saw good views of green rosellas feeding on

the blaekberries. I spotted a very large, dark eehidna. Arjan was thrilled as this was a highlight of his trip. He had already asked me if there was a ehanee we would see one and I had reassured him that it was quite likely espeeially in the dry, east eoast terrain. He did not expect to find a seeond eehidna soon after, taking some great photos of them both as they fed. Both he and Noah reaeted with similar enthusiasm to finding an eehidna and it was heartening that they were keen on other wildlife as well as birds.

From the lookouts near Devils Kitehen, we saw New Holland honeyeaters. Arjan was over the moon at seeing dozens of Bullers and shy albatross, short-tailed shearwater and gannets feeding elose in shore. We hardly needed our teleseopes as they flew elose enough to see with the naked eye! We also observed a white-bellied sea eagle snateh a sooty oystereateher from a roek shelf and carry it off along the eliffs! I had to drag Arjan away from the albatross and he sorely regretted missing a pelagie the previous Sunday for whieh he would have ehanged his sehedule. However, he is determined to eome baek to Tasmania with his girlfriend, Camilla.

Before it beeame dark, we drove to Taranna to look for Cape Barren geese, finding a eouple in a field beside the road to Koonya. It was one of the birds he had always wanted to see.

Hunger was allayed by Easter buns as we scooted down to the Waterworks hoping for masked owl and boobook. Neither was heard but we did hear an owlet-nightjar and had some exeellent views of about four bettongs as well as lots of brushtail possums. We tried again for owls further up the road and were rewarded with a tawny frogmouth sitting on a post above the Ridgeway turnoff heading to the Huon Highway.

A peanut butter sandwieh was dinner before heading off to bed for an early start the next morning. I awoke at 5 am in time to prepare a eooked breakfast of baeon and eggs, mushrooms and home grown, fried tomatoes with basil. Little did I know that Arjan was a gourmet cook at home and loved to invite groups of friends over for a meal every weekend. Breakfast hit the spot before we dashed off up Mt Wellington as the light hit the Organ Pipes. I drove straight to the top for a view of Hobart and its surroundings while the mountain was elear but a eloud enveloped us as we arrived so he eould only appreeiate the view below us. As Arjan took photos and a selfie while standing on a boulder, I took some of him lit by the low morning light.

Dropping baek down to the Springs, we soon saw the serubtit, Tasmanian serubwren and Tasmanian thornbill along the traek towards Sphinx Roek. The pink robin and grey eurrawong showed up near the entranee to the Counеil aeeess road to the water tank above Fern Tree.

The Waterworks was still in morning sun when we arrived, finding the eommon bronzewing sunning itself, the dusky robin, searlet robin and a surprise – a group of beautiful firetails feeding below a bull oak at the start of the traek from the top end of the reservoir. A brush bronzewing was ealling from the forest. Native hens were feeding and having a tiff. Arjan was faseinated that they could not fly.

At Lower Sandy Bay we watehed a group of eastern rosellas near the playground. At the Truganinni Traek in Taroona there was a short burst of song from the blue gums of what I reeognised as a swift parrot but Arjan missed hearing it and it would not eall again so did not add it to the list.

Peter Murrell Reserve in Kingston gave Arjan good views of strong-billed honeyeaters and a yellow wattlebird but alas no forty-spotted pardalotes although there was a mixed flock of spotted and striated pardalotes including some juveniles which could have been easily mistaken for forty-spotted. However, the forty-spotted pardalotes at the tennis courts at Tinderbox were unmistakable and we celebrated Arjan's sighting of his final Tasmanian endemic with our usual high five! This spot also gave a good view of a female satin flycatcher and we could hear little penguins making their sharp barking calls from the water below. Down at the beach Arjan spotted a seal among the yachts at anchor and as I looked with my binoculars, I noticed a little penguin swimming behind a boat. Arjan saw it too as it emerged in front of the boat and was excited as it had been on his wish list.

There was a small chance of finding a ground parrot and the southern emu wren up Snug Tiers but I only managed to drive about half way up the rough track. At Arjan's request we headed to Muirs at the Hobart docks for scallops and chips. As a detour to the airport we tried once more for the striated fieldwren at Pipeclay Lagoon but instead had good views of both male and female white-fronted chats.

While we were birding, Arjan was entering his sightings onto a website and blog. Normally he would be accompanied by a film crew but they did not come to Tasmania. He is averaging more birds than his friend Noah who has inspired him and shown that it can be done. Arjan's large support crew includes his parents. His mother works for a travel agency and books all his flights and his father, an engineer helps with the organising. This trip has taken years of planning. His World Big Year aims to raise funds for bird conservation through Birdlife International, helping to save birds from the brink of extinction. In the Netherlands, Arjan has been a keen birder since he was a child and now he has a regular TV series about birds as well as giving talks and tours.

With me he really enjoyed being able to speak Dutch all day after three months away from home. I am sure that he will return to Tasmania one day with Camilla to do a pelagic and to see more of our birds and wildlife. I have given him an open invitation. With his huge worldwide following, he is a great ambassador for our birds. I felt very privileged to be able to help him find them.

WEB LINKS

http://arjandwarshuis.com/

https://www.dutchbirding.nl/

BOOK REVIEWS

The Feathered Tribes of Van Diemen's Land *by Sarah Lloyd, Tympanocryptis Press (2015), Birralee, paperback, 104 pages*

REVIEWED BY: **Els Wakefield**, 12 Altna-Craig Avenue, Mt Stuart 7000, elswakefieldtas@gmail.com

Sarah Lloyd lives in a house in the forest many kilometres from any town, isolated by a rough road aeeessible only to brave drivers. The peace and beauty of her surroundings provide a unique opportunity to observe the birds around her. From her childhood in Hobart onwards, Sarah has obviously gleaned minute details from her own and others' observations of birds. This book is a distillation of her life- long knowledge and enthusiasm.

More intimate than a field guide, this is an ideal book for a beginner in the field of bird watching as Sarah keeps her style simple, easy to read and direct. Experieneed birders can enjoy it as a refresher and are also reminded how mueh there is still to learn.

Sarah deseribes how and where to find birds, the different types of birds, how they sing and why their ealls vary so much. She goes on to explain the various threats to birds and eneourages good eeologieal praetiees.

Sarah's photographs throughout the book help to illustrate various points and are a useful guide to identification.

At the beginning of each chapter, Sarah has included quotes from James Bisehoff, adding a quirky perspeetive from the 1800s to compare to the present day attitudes and knowledge.

From start to finish, I could not put this book down. Reading it felt like a delicious refresher eourse. In *The Feathered Tribes of Van Diemen's Land*, Sarah presents a highly informed personal insight into Tasmania's birds as seen by one of our State's top field naturalists. I can thoroughly reeommend it.

Tree Hollows in Tasmania: A Guide *by Amelia Koch, CRC for Forestry and the Forest Practices Authority (2009), Hobart, booklet, 27 pages*

REVIEWED BY: **Perpetua Turner**, School of Land and Food, University of Tasmania, Hobart, Tasmania 7001, perpetua.turner@utas.edu.au

Who really eares about hollows in Tasmania? The appendix in this guide lists eight bat speeies, five arboreal marsupials (possums) and 29 bird speeies, and don't forget an unknown number of invertebrates and a plethora of humans. Add to this that some of these wildlife are threatened, and some are introduced speeies having negative impacts, and that is more than enough to warrant

publication of this excellent and much needed guide to hollows in Tasmania.

As for Tasmanian bats and their habitat – a guide (Cawthen 2015), Tree hollows in Tasmania is published by the Cooperative Research Centre for Forestry and the Tasmanian Forest Practices Authority. It aims to 'help people interested in tree hollows identify the trees that are most likely to be used by hollow dependent species'. As such it is aimed at a wide audience, including managers and field practioners who are legally obligated to conserve hollows, to the general public who may be interested in identifying hollows in their area. Educators will find the guide of use in identifying hollows and habitat trees for wildlife and full colour photographs throughout provide a wealth of information.

Hollow formation is at the mercy of environmental processes, and these can take time. Factors such as fire, wind damage, and invertebrate or vertebrate damage all play a part. Unlike mainland Australia, termites are not the principal source of tree hollows, rather it is beetles boring in the wood, and a range of other factors, that produce them. This means identifying hollows in Tasmania requires guidance, something this booklet does very well.

Half of the guide covers what makes a good hollow, how to identify a hollow, and selecting habitat trees. These parts form the crux of the guide and the text of each page is accompanied by 2-9 clear and detailed photos displaying the range of hollows to be found and how to select a habitat tree. Given searching for hollows and selecting for habitat trees is predominantly a visual exercise this focus on clear and detailed photographs is why the guide achieves its aim so well. The images on false hollows and poor visibility hollows are good examples of common mistakes. Numbered photos of tree form are a great reference for field practioners, allowing them to cite an image and instantly give a manager a visual reference for a tree. The examples of habitat trees bring home the 'key attributes' listed on p. 17, giving the reader a good pictorial reference for the field.

The information contained in the guide is established on evidence-based practice. This fact is apparent in the synopsis of 'How many hollows are enough?' where it is obvious this simple question is dependent on numerous factors. The disclaimers on the inside cover of the guide suggest for greater detail readers refer to the Forest Practices Authority Hollows Technical Note and the 'Additional reading' included at the end of the guide provides the reader with leads to answers. 'Nest-boxes – a practical solution?' is a summary that will be of use for conservation management groups and students.

Three main principles for land managers (forest operators and other forest and land users) are provided at the end of the guide, but they are also a message for us all. Good hollow management requires: retention; protection; recruitment. Through descriptions, practical suggestions and direction this booklet provides guidance for all three principals and is a must have

resource for management of tree hollows in all parts of Australia, but especially Tasmania.

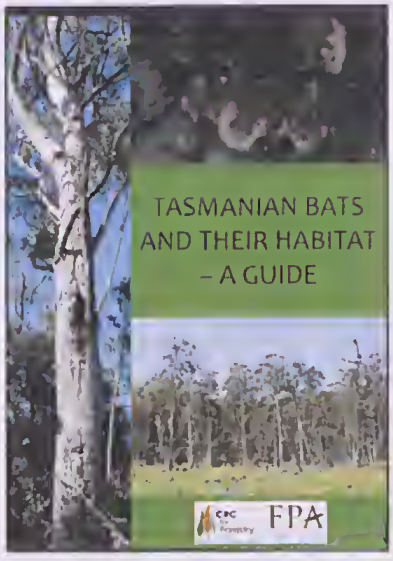
This booklet is available from Fullers in Hobart and the pdf version can be downloaded from either the CRC Forestry's website (www.crcforestry.com.au) or the Forest Practices Authority's website (www.fpa.tas.gov.au).

Tasmanian Bats and their Habitat – A Guide *by Lisa Cawthen, CRC for Forestry and the Forest Practices Authority (2015), Hobart, booklet, 23 pages (ISBN 9780646935331)*

REVIEWED BY: **Perpetua Turner**, School of Land and Food, University of Tasmania, Hobart, Tasmania 7001, perpetua.turner@utas.edu.au

Whether you are familiar with bats or not, if you have an interest in what wildlife could be inhabiting the forest near your house, or a gully in your suburb, this guide is a must. In just 23 pages Cawthen has managed to provide a detailed, colourful and descriptive insight into the essentials for surveying, identifying and managing not only the Tasmanian bats themselves but their habitat as well. As for *Tree Hollows in Tasmania* by Amy Koch (Koch 2009), Tasmanian bats and their habitat, is published by the Cooperative Research Centre for Forestry and the Tasmanian Forest Practices Authority. These booklets bring together data and research from a multitude of sources so you can be assured the information contained is founded on evidence based practice.

Of the approximately 75 species of bats in Australia and outlying islands, the island of Tasmania has eight micro-bat species, with two vagrant species, and no mega-bats. The threats are direct or indirect and are numerous; tree removal, drought, fire, storms, predation, disease etc. The importance of habitat should not be underrated and, as such, is a focus of the booklet. Cawthen dedicates four pages of text to habitat, accompanied by detailed photographs of habitat types and roosting habitat including hollow, fissures, under bark, buildings, caves and mines, and even a comment on artificial bat boxes. I was most intrigued to read about the uncommon and mostly temporary roosting habitats - at least bats have found a use for old umbrellas.



Surveying for bats is absolutely delightful and Cawthen neatly summarises the approaches; call surveys (active or passive) or capture (and their limitations) and when to survey. Two pages are provided detailing bat calls, for use either in the field or the office. Technology is rapidly updating and changing, so it is wisely not detailed in this booklet. However, right from the start the booklet provides you with additional reading and details for the Australasian Bat Society so you can find up-to-date information in this regard.

If you happen to find a bat, Cawthen provides a neat key for identification, with a page of information detailing each of the Tasmanian

bats, and one page for the two vagrant species. Former scientific nomenclature, excellent high quality photographs and information about foraging behaviour and roost habits are included.

It is important to remember this booklet is a guide, and as the disclaimer states, it is not a comprehensive resource so the additional reading is an important inclusion. It will be useful for students in upper primary, secondary and tertiary levels, as well educators, field practitioners, managers and naturalists. In fact, for the low hard copy price (available from Fullers in Hobart) and the availability of the pdf version (download from the Forest Practices Authority's website: www.fpa.tas.gov.au), there really is no excuse for not having a copy and learning about bats. What are you waiting for?

SPONSORSHIP OF *THE TASMANIAN NATURALIST*

The Tasmanian Naturalist is published annually, with printing and distribution costs sourced directly from membership fees. With ever increasing costs to production and the Club's recent shift to a higher quality presentation of the journal, which includes perfect binding, better quality paper and full colour, the Club now looks for support to offset the higher costs of production each year. In addition, the Club undertook a major project to scan in all articles from *The Tasmanian Naturalist* since its inception in 1907, creating pdf files now available for free from the Club's website – this project was wholly unfunded.

Historically the journal included advertising, and some natural history clubs around Australia do this. However, our Club has preferred to look for sponsorship from individuals, organisation and government departments. The editorial team usually discusses potential sponsorship with authors and their affiliated organisations as a matter of opportunity i.e. after articles are accepted for publication following the review process, such that any sponsorship is clearly independent of the review. As such, sponsorship in the last few years has been from groups closely related to some authors, although sponsorship from a broader base is sought.

For any individuals or organisations seeking to support the Tasmanian Field Naturalists Club Inc. through sponsorship of its annual scientific journal, please contact the editorial team in the first instance. All sponsors are acknowledged in the Editorial Note at the beginning of the issue and in this sponsor statement (usually with a link to the sponsor's website), and receive hard copies of the journal for their own promotion.

The 2015 edition of *The Tasmanian Naturalist* has been generously supported by Hans & Annie Wapstra, dedicated naturalists and active members of the Tasmanian Field Naturalists Club.

ADVICE TO CONTRIBUTORS

The Tasmanian Naturalist publishes articles on all aspects of natural history and the conservation, management and sustainable use of natural resources, with a focus on Tasmania and Tasmanian naturalists. These can be either in a formal or informal style. Articles need not be written in a traditional scientific format unless appropriate for the content. A wide range of types of articles is accepted. For instance, the journal will publish articles that:

- summarise or review relevant scientific studies, in language that can be appreciated by field naturalists;
- stimulate interest in, or facilitate in identifying, studying or recording particular taxa or habitats;
- record interesting observations of behaviour, phenology, natural variation or biogeography;
- stimulate thinking and discussion on points of interest or contention to naturalists;
- put the study of natural history today into context through comparisons with past writings, archives, etc.; and
- review recent publications that are relevant to the study of Tasmanian natural history.

Book reviews, web site reviews, poetry and prose and other informal natural-history related content are also accepted. If you are thinking of submitting such material, please check with the Editor first, to avoid duplication of items such as book reviews and for appropriateness of content.

Submission of manuscripts

Manuscripts should be emailed to the editor at mickjbrown1@outlook.com or mailed to the Club's address. Contact the Editors (see the Club's website for current contact details) prior to submission if you have any issues to discuss. Formal articles should follow the style of similar articles in recent issues and include an abstract. Informal articles need not fit any particular format and need not have an abstract. Unless otherwise stated, all images are by the author(s). Formal articles will be refereed. Responsibility for accuracy and currency of taxonomic nomenclature rests with the author(s). Please refer to the *Guidelines for Authors*, available on the Club's website.

Submissions should be provided electronically in standard wordprocessing files. Images, tables and diagrams can be submitted in separate files or embedded in the document, but it is important that they be of high resolution and suitable to be published at A5 size.

Articles must be submitted by 31 August to meet publication schedules.

Views and opinions expressed in papers in the journal reflect those of the author(s) and are not necessarily those of the Tasmanian Field Naturalists Club Inc.

Tasmanian Field Naturalists Club

G.P.O. Box 68, Hobart, Tasmania 7001

Founded 1904

OBJECTIVES

The Tasmanian Field Naturalists Club aims to encourage the study of all aspects of natural history and to advocate the eonservation of our natural heritage. The club is comprised of both amateurs and professionals who share a common interest in the natural world.

ACTIVITIES

Members meet on the first Thursday of each month in the Life Sciences Lecture Theatre 1 at the University of Tasmania at Sandy Bay. These meetings include a guest speaker who provides an illustrated talk. An excursion is usually held on the following weekend to a suitable site to allow field observations of the subject of that week's talk. The Club's committee coordinates input from members of the Club into natural area management plans and other issues of interest to members.

THE TASMANIAN NATURALIST

The Club publishes the journal *The Tasmanian Naturalist*. This annual journal provides a forum for the presentation of observations on natural history, and views on the management of natural values, in both formal and informal styles.

MEMBERSHIP

Membership of the Tasmanian Field Naturalists Club is open to any person interested in natural history. Members receive *The Tasmanian Naturalist* annually, plus a quarterly bulletin with information covering forthcoming activities, and the Club's library is available for use.

Prospective members should either write to the Secretary at the above address, phone our President (details on website), or visit our website at: http://www.tasfieldnats.org.au/.

Membership rates

Adults	$30
Families	$35
Concession	$25
Junior	$25

Subscription rates for *The Tasmanian Naturalist*

Australia	$20
Overseas	$25

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